



SERIES

# SCIENCE

The Main Book

By A Group of Supervisors



Interactive E-learning  
Application



4<sup>th</sup>  
Primary  
2024  
FIRST TERM

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# 1

UNIT

## THEME ONE : SYSTEMS



LIVING SYSTEMS

# Get Started

## What I Already Know



- There are many factors that affect the life of living organisms in their environments such as :
  - Hot and cold temperature.
  - Availability of food.
  - Amount of water.
  - Availability of shelter.
- Overtime, animals and plants adapt or change according to the previous factors, so that they can live, eat, breathe, stay safe and so on.

### Examples :

- Camel's body is covered with a special thick hairy skin to protect it from the hot weather in desert.



Camel

- Palm trees have strong roots to fix them in the soil against strong winds in desert.



Palm tree

### • In this unit, you are going to study :

- Types of adaptations of living organisms.
- How humans and animals use their senses to gather (collect) information.
- Adaptations of some animals that are active at night.
- How humans and animals communicate and transfer information.

### • Unit Project : "Bat Chat"

At the end of this unit, you will make a research project about "Bats" to learn how their adaptations help them to navigate, hunt and communicate.



Bat

Concept

1.1

## Adaptation and Survival





## Learning outcomes

By the end of this concept, your child will be able to :

- Model the relationships among an organism's survival, habitat, adaptations and body systems.
- Argue from evidence that plants and animals have structures and behaviors that help them survive and grow.
- Explain how structural adaptations help organisms survive in specific environments.
- Argue from evidence that multiple adaptations or organs work together in systems to help organisms survive in specific habitats.

## Key vocabulary

- |                      |           |
|----------------------|-----------|
| • Adaptation         | • Arctic  |
| • Camouflage         |           |
| • Digestive system   |           |
| • Ecosystem          | • Energy  |
| • Extinct            | • Ocean   |
| • Organism           | • Pollute |
| • Predator           | • Prey    |
| • Reproduce          | • Survive |
| • Respiratory system |           |

## Notes For Parents On Concept [1.1]

Lessons	Activities	What you should do with your child
1	Activity 1	Explain to your child how living organisms can adapt to the environment in which they live.
	Activity 2	Discuss with your child how penguins can adapt to live in polar regions.
	Activity 3	Explain to your child how different bears, caracal, fennec fox and some desert lizards can adapt to live in their environments through "camouflage".
2	Part (A)	Activity 4 Discuss with your child the structural adaptations and behavioral adaptations of fennec fox, arctic fox and bull shark.
	Part (A)	Activity 5 Discuss with your child the structural adaptations and behavioral adaptations of panther chameleon.
	Part (B)	Activity 6 Discuss with your child the structural adaptations and behavioral adaptations of plants such as acacia tree and kapok tree.
	Part (B)	Activity 7 Explain to your child how some plants can adapt to live in their environments such as mangrove tree, water lily, palm tree...etc.
3	Activity 8	Discuss with your child how some organs of the human digestive system can adapt to do their functions to help the human body survive.
	Activity 9	Discuss with your child how some organs of the human respiratory system can adapt to do their functions to help the human body survive.
4	Activity 10	Let your child think about the similarities and differences between the respiratory system of humans and fish.
	Activity 11	Discuss with your child some of the ecosystem changes that are caused by the nature and also the effect of human activities on plants, animals and humans themselves.
5	Activity 12	Help your child to think like a scientist by answering a question about one of the main points of this concept then write his/her claim, evidence and the scientific explanation.
	Activity 13	Let your child determine a problem in the environment and find out the best solution for this problem such as : how to protect some types of frogs from extinction.

# LESSON ONE

## Activity 1 Can You Explain ?



**Do you notice how each of the previous living organisms protect itself from extreme hot climate ?**

- 1 **Starred agama lizard** that lives in the **desert** protects itself by finding shaded area during a hot sunny day to keep its body cool.
  - 2 **Palm leaves** are covered with waxy layer to protect them from extreme hot climate.
  - 3 **Human being** protects himself from extreme hot climate by using umbrella and light clothes.
- **Each of the previous living organisms has different ways to protect itself from extreme hot climate, and these different ways are known as “ Adaptations ”.**

### Adaptations :

They are characteristics that help living organisms to survive and reproduce in the ecosystem in which they live.



### Note

**Ecosystem** is an area in which living and nonliving things interact with each other.

- Adaptations occur over many generations.

### ► In this concept, we will study :

- Types of adaptations.
- Human's body systems and their adaptations.
- Plant adaptations.

agama lizard  
shade area  
waxy layer

سحلية العجمة  
منطقة الظل  
طبقة شمعية

extreme  
hot climate  
adaptation

شديد  
المتاخ الحار  
تكيف

survive  
reproduce  
characteristics

يبقى حيا  
يتکاثر  
صفات

ecosystem  
interact  
generations

نظام بيئي  
يتفاعل  
أجيال

**Activity 2 Penguin Feet**

► Look at the following pictures, then put (✓) or (✗) :



- ① You can stand on ice in barefeet  
for about 5 minutes. ( )

- ② Penguin can walk on ice for  
a long period of time. ( )

**Climate is considered one reason for adaptation of many living organisms over generations.**

### **Adaptation of penguins to survive in cold environment :**

Unlike most birds, penguins cannot fly but they can stand on ice all day.

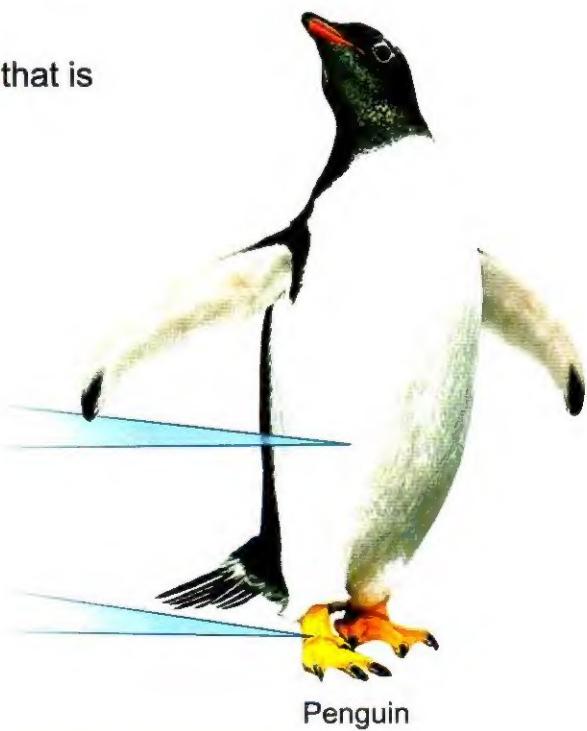
- **Habitat :**

Penguin in **Antarctica** lives in a **polar climate** that is one of the coldest places on the Earth.

- **Adaptation :**

**Its body :**

Penguin's body is covered with dense feathers and a thick layer of fat **to keep its body warm.**



**Its feet :**

Penguin's feet have no feathers.

**Note**

Habitat is the environment where living organisms live in.

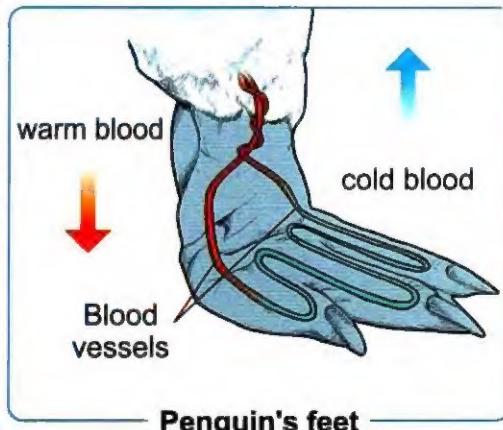
## How do the penguin's feet stay warm ?

The penguin's feet stay warm due to the way of moving the blood in blood vessels through its feet as follows :

1 Blood vessels bring cold blood up from the feet.

2 Other blood vessels bring warm blood down to the feet from the feather-coated body.

3 These vessels weave around each other, so the warm blood vessels heat up the cold blood vessels, and the heat transfers to the penguin's feet.



- This adaptation causes that the cold blood moving up into the penguin's body becomes warm and the blood moving down to the penguin's toes is warm enough to keep its toes from freezing.



**Give reason for ...**

**Penguins' feet help them survive in cold climate.**

Because blood vessels that carry warm blood from the body weave around the blood vessels that carry cold blood from the feet. This leads to warming the blood vessels of the penguin's feet to survive in cold climate.



**Check your understanding**

► Put (✓) or (✗) :

1. The blood vessels coming downwards to the penguin's feet carry warm blood. ( )

2. Penguins can adapt to live in extreme cold environment by having feathers and fat in their feet. ( )

### Activity 3 | Adaptations for Survival

► Some animals have some adaptations that help them survive and reproduce in their different environments.

**Examples :**

#### 1 Polar bear



Polar bear

- **Habitat :** Arctic region (polar region).
- **Adaptation :**
  - It has white and thick fur :**
    - Its white fur helps it blend in with the snow as it sneaks up on its prey.
    - Its thick fur helps it stay warm in its cold arctic region.

#### 2 Brown bear and black bear



Brown bear



Black bear

- **Habitat :** Forests.

- **Adaptation :**

**They have dark fur** to help them hide among the trees when they hunt.

#### 3 Caracal and fennec fox



Caracal



Fennec fox

- **Habitat :** Desert

- **Adaptation :**

**They have sandy-colored fur (tan-colored fur)** to help them blend in with desert landscapes.

#### 4 Some desert lizards



Desert lizard

- **Habitat :** Desert

- **Adaptation :**

**They have colorful scales** that make them hide among the colorful rocks in the desert.

arctic region  
blend  
caracal  
landscapes

منطقة القطب الشمالي  
يندمج  
القط البري  
المناظر الطبيعية

الغابات  
يصطاد  
يسلل

ألعاب الفنون  
حراسيف  
يخفي

- From the previous examples, we notice that some animals adapt in many ways to hide from their predators or their preys by a way of adaptation called "camouflage".

### **Camouflage :**

It is a type of adaptation that some animals use to hide from their predators or their preys by blending in with the surrounding environments.

#### **Notes**

- Predator is an animal that hunts and eats another animal.
- Prey is an animal that is hunted and eaten by another animal.



#### **Check your understanding**

##### ► Put (✓) or (✗) :

- Polar bear has a dark fur to blend in with the snow. ( )
- Brown bear lives in arctic region, while polar bear lives in forest. ( )

##### ► Complete the following statements :

- Fennec fox has ..... colored fur to help it blend in with desert landscapes.
- The type of adaptation that some animals use to hide from their predators or their preys is known as .....

In the Assessment Book :

Try to answer :  
Self-Assessment ①

# Exercises on Lesson 1

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. The starred agama keeps cool during a hot sunny day in desert by .....
  - a. eating green vegetables.
  - b. drinking more water.
  - c. secreting more sweat.
  - d. finding a shaded area.
- 2. Adaptation helps the living organism in all the following characters, except .....
  - a. surviving.
  - b. reproduction.
  - c. hiding.
  - d. death.
- 3. Penguins live in a polar climate which .....
  - a. is one of the hottest places on Earth.
  - b. is one of the coldest places on Earth.
  - c. looks like the rainy climate.
  - d. looks like the forest climate.
- 4. Which of the following ways help penguins to adapt to live in polar climate ? .....
  - a. Their bodies are covered with skin.
  - b. Their bodies are covered with dense feathers only.
  - c. Their bodies are covered with a thick layer of fat only.
  - d. Their bodies are covered with dense feathers and a thick layer of fat.
- 5. In penguin's feet, .....
  - a. warm blood vessels weave around cold blood vessels.
  - b. warm blood vessels weave around its toes.
  - c. cold blood vessels weave around its toes.
  - d. cold blood vessels weave around dense feathers.
- 6. Penguin's feet have blood vessels that bring ..... up from its feet towards its body.
  - a. cold water
  - b. warm water
  - c. cold blood
  - d. warm blood
- 7. The presence of a thick white fur is an adaptation in .....
  - a. starred agama lizard.
  - b. polar bear.
  - c. fennec fox.
  - d. forest bear.
- 8. Bears that live in forests have fur ..... that of polar bears.
  - a. whiter than
  - b. darker than
  - c. similar to
  - d. brighter than

(Cairo 2022)

(Alex. 2023)

- 9. Fennec fox and caracal have ..... that help them blend in with desert landscapes. (South Sinai 2023)
  - a. colorful scales
  - b. thick white fur
  - c. sandy-colored feathers
  - d. sandy-colored fur
  
- 10. Desert lizards have ..... that make them hide among the colorful rocks in the desert.
  - a. tan-colored fur
  - b. colored scales
  - c. sandy colored feathers
  - d. dark fur
  
- 11. Camouflage means that the animal .....
  - a. can be seen easily among its surrounding environment.
  - b. is hard to be seen among its surrounding environment.
  - c. is easily to be seen by its preys.
  - d. can be seen easily by its predators.
  
- 12. Which of the following birds is more difficult to be seen by its predator ? .....
  - a. A red bird on a green tree.
  - b. A blue bird on a green tree.
  - c. A yellow bird on a green tree.
  - d. A green bird on a green tree.

**2 Choose from columns (B) and (C) what suit them in column (A) :**

(A) Animal	(B) Adaptation	(C) Helps it to ...
1. Penguin	a. has dark fur	A. stay warm and hide from preys
2. Caracal	b. has thick white fur	B. keep its body warm
3. Brown bear	c. has thick layer of fat and dense feathers	C. blend in with desert landscapes
4. Polar bear	d. has sandy-colored fur	D. hide among the trees when it hunts

1. .... → ....      2. .... → ....      3. .... → ....      4. .... → ....

**3 Put (✓) or (✗) :**

- 1. The desert lizard blend in with large green trees, to hide from its enemies. ( )
- 2. Animals that live in hot deserts have special ways to keep their bodies cool during hot sunny days. ( )
- 3. Living organisms can survive and reproduce in different environments by the help of adaptation. ( )

- 4. Penguin's body is covered with dense feathers and a thin layer of fat to keep its body warm. ( )
- 5. Thick white fur is an adaptation in bears that live in polar regions. (Suez 2023) ( )
- 6. The sandy-colored fur of caracal helps it blend in with snow in polar environment. ( )
- 7. Some types of lizards have colored feathers to help them blend in with rocks in their ecosystem. ( )

**4 Complete the following sentences by using these words :**

(camouflage – habitat – adaptation – predator – prey)

- 1. The environment where living organisms live in is called .....
- 2. An animal that hunts and eats another animal is called a ..... while ..... is an animal that is hunted and eaten by another animal.
- 3. The characteristic that helps living organisms to survive and reproduce in the ecosystem is known as .....
- 4. Type of adaptation that some animals use to hide from their predators or their preys is known as ..... (Sharkia 2022)

**5 Write the scientific term of each of the following :**

- 1. A characteristic that helps living organisms to survive and reproduce in the ecosystem in which they live. (.....)
- 2. A bird that has a thick layer of fat and dense feathers to adapt extreme cold weather. (.....)
- 3. It covers the body of some types of bears to blend in with snow and keeps their bodies warm. (Luxor 2023) (.....)
- 4. A type of foxes that has sandy-colored fur to adapt its desert environment. (.....)
- 5. A property that helps animals to blend in with their surrounding environment. (Cairo 2022) (.....)

**6 Complete the following sentences :**

- 1. The penguin's body can keep warm through a thick layer of ..... and dense ..... (Aswan 2023)
- 2. A penguin can stand around on ice all day due to the weaving of ..... around each other in its feet.
- 3. Forest bears have ..... or ..... colored fur, while polar bears have ..... colored fur. (Cairo 2023)
- 4. In desert environment, ..... and ..... are covered with sandy-colored fur.

5. Among animals that can live in desert ecosystem are ..... lizard and ..... fox.
6. The fur of a polar bear is thick to keep its body ..... in polar climate, while it has ..... color to blend in with snow.
7. The body of some types of lizards are covered with ..... to blend in with colored rocks in their environments.
8. Among animals that can live in polar environment are ..... and .....
9. Animals can blend in with their surrounding environments to hide from their ..... and preys through ..... property.

**7 Give reasons for :**

- 1. The starred agama lizard always looking for shade areas in desert.  
.....  
.....
- 2. The penguin's body has a thick layer of fat and dense feathers.  
.....  
.....
- 3. The blood vessels in the penguin's feet weave around each other.  
.....  
.....
- 4. Some desert lizards have colorful scales.  
.....
- 5. Fennec fox has sandy-colored fur, while polar bear has a white fur. (Minia 2023)  
.....  
.....
- 6. Some animals have the ability to make camouflage adaptation.  
.....  
.....

**8 What happens if ... ?**

- 1. The warm blood vessels and cold blood vessels in the penguin's feet do not weave around each other.  
.....  
.....
- 2. The polar bear has thin fur instead of its thick fur.  
.....  
.....

3. The body of fennec fox is covered with black fur.

4. Some types of lizards are not able to make camouflage adaptation.

### 9 Compare between :

1.

Points of comparison	Penguin	Fennec fox
1. Habitat :	.....	.....
2. Body is covered with :	.....	.....

2.

Points of comparison	Polar bear	Forest bear
1. Habitat :	.....	.....
2. Fur is covered with :	.....	.....

### 10 Choose the animals that use camouflage adaptation to blend in with its environment :



a. Deer



b. Frog



c. Cow



d. Lizard

# LESSON TWO [Part A]

## Activity 4 Types of Adaptations

► Look at the following pictures, then put (✓) or (✗) :



- 1 Camel's body is covered with a special thick hairy skin to adapt to live in desert. ( )

- 2 Polar bear has thick white fur to adapt to live in forests. ( )

► In this lesson, we will study types of adaptations and explore these types in some animals.

### Types of adaptations

#### 1. Structural adaptation

#### 2. Behavioral adaptation

##### Definition

It is a change in the body structure of a living organism to help it survive.

It is a change in the behaviors or acts of a living organism to help it survive.

##### Examples

- The blood vessels in the penguin's feet.
- The thick fur of the polar bear.

- Desert lizard looks for shade during hot sunny days.
- Migration of some animals towards certain regions.

► Now, we will study types of adaptations in some different animals.

special  
thick hairy skin

خاص  
جلد سميك مشعر  
change  
structural adaptation

تغیر / تغيير  
تكيف تركيبی  
behavioral adaptation  
migration

تكيف سلوكی  
التجارة  
25

**1 Fennec fox :**

Habitat	Structural adaptation	Behavioral adaptation
<b>Hot dry desert</b>  Fennec fox	<ul style="list-style-type: none"> <li>- It has a tan-colored coat (sandy-colored fur) that :           <ul style="list-style-type: none"> <li>• provides camouflage to hide in a sandy, rocky environment.</li> <li>• protects it from the hot Sun.</li> </ul> </li> <li>- It has extra-large ears to help it lose the heat to cool its body.</li> </ul>	<ul style="list-style-type: none"> <li>- It pants like dogs to cool its body, where it takes up to 700 breaths per minute.</li> <li>- It lives in burrows to stay cool during the sunny days.</li> <li>- It eats all kinds of food like insects, fruit, plant roots and even the remains from another animal's prey.</li> </ul>

**2 Arctic fox :**

Habitat	Structural adaptation	Behavioral adaptation
<b>Tundra desert</b> with temperature as cold as (50°C) below zero in the winter months.  Arctic fox in winter  Arctic fox in summer	<ul style="list-style-type: none"> <li>- It has a thick fur coat to keep its body warm in extreme cold climate.</li> <li>- Its fur coat is white during winter but turns brown in summer when the snow melts to help it sneak up on prey in any season.</li> <li>- It has short ears and legs to help it stay warm.</li> </ul>	<ul style="list-style-type: none"> <li>- It lives in burrows to stay warm at night.</li> <li>- It eats all kinds of food like insects, fruit, plant roots and even the remains from another animal's prey.</li> </ul>

**Note**

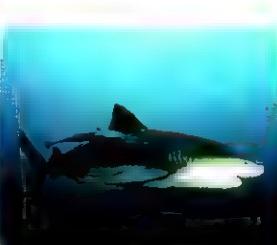
The special shape of ears in both fennec and arctic foxes allow excellent hearing to help them hunt.

**Give reason for ...**

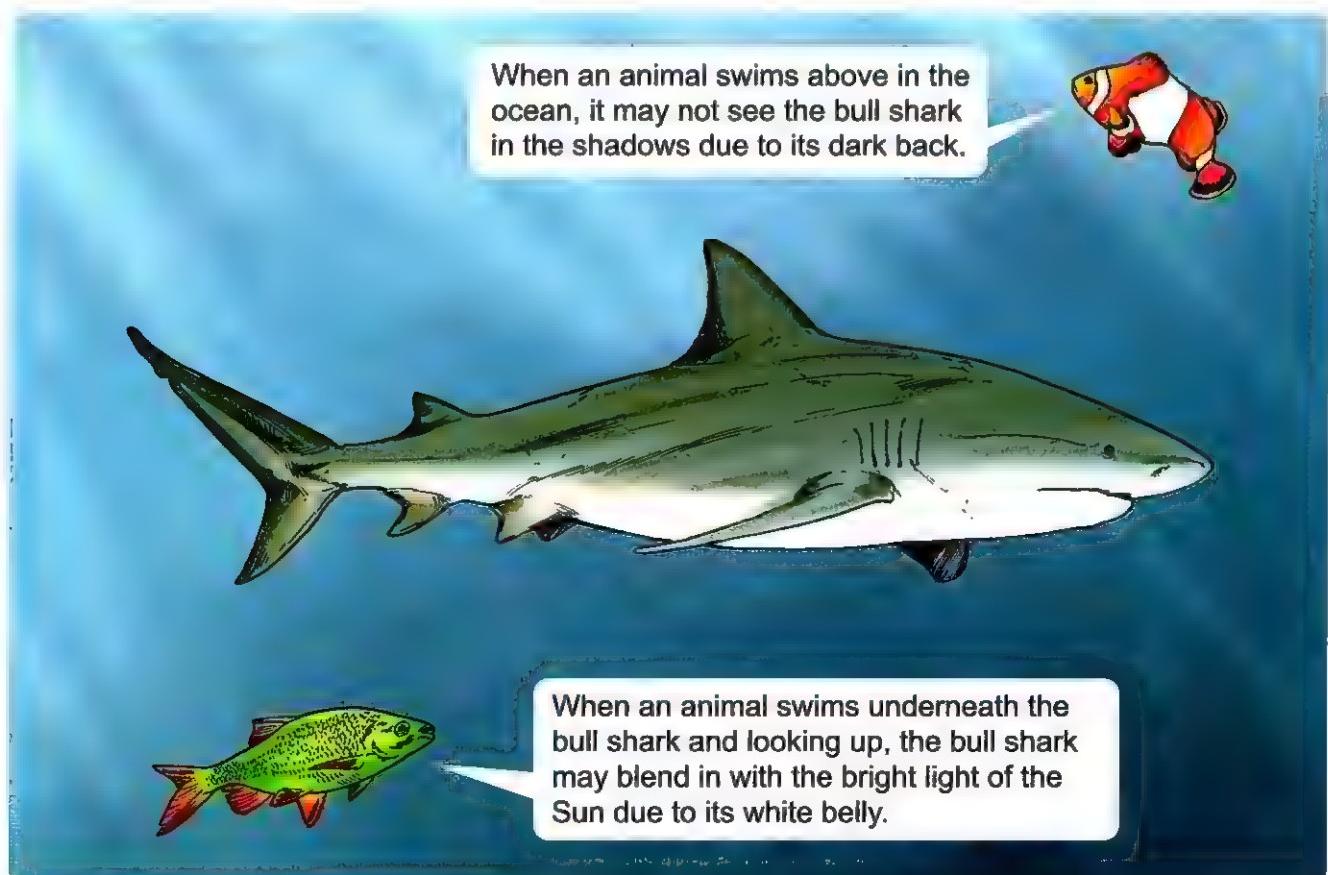
**Both fennec fox in hot dry desert and arctic fox in cold tundra eat all kinds of food.**  
 Because it is hard to find food in the hot dry desert and in the cold tundra.

### 3 Bull shark :

► Most sharks can live only in salt water but in bull sharks, their bodies have adapted to live in both fresh water and salt water.

Habitat	Structural adaptation	Behavioral adaptation
<b>Fresh water and salt water.</b>  Bull shark	<ul style="list-style-type: none"> <li>- Its body is adapted to survive in fresh water, where no other sharks live in fresh water, so it has less competition to find food.</li> <li>- It uses a camouflage strategy called "<b>countershading</b>", where it has a dark back and white belly to sneak up on prey.</li> <li>- It has sharp teeth to cut its prey's flesh.</li> </ul>	<ul style="list-style-type: none"> <li>- It eats different types of food as it lives in both fresh water and salt water.</li> <li>- It hunts during the day and at night, so it can surprise its prey.</li> </ul>

#### Countershading in bull shark :



bull shark  
fresh water  
salt water

قرش النور  
مياه عذبة  
مياه مالحة  
competition  
sharp teeth  
countershading

منافسة  
أسنان حادة  
التباعين اللوني  
belly  
shadow  
underneath

طن  
ظل  
تحت



## Check your understanding

► Write the scientific term :

1. It is a change in the body structure of a living organism to help it survive.

( ..... )

2. It is a change in the behaviors or acts of a living organism to help it survive.

( ..... )

► Use the following structural and behavioral adaptations of the following animals to complete the table below :

Hunts in day and night – Tan-colored coat – Panting – Sharp teeth –

Short ears and legs – Big ears – Can live in fresh water – Camouflage

by season – Countershading.

Animals	Structural adaptation	Behavioral adaptation
Fennec fox :	<ul style="list-style-type: none"> <li>• .....</li> <li>• .....</li> <li>• Strong sense of hearing.</li> </ul>	<ul style="list-style-type: none"> <li>• .....</li> <li>• Living in a burrow.</li> <li>• Eat different kinds of food.</li> </ul>
Arctic fox :	<ul style="list-style-type: none"> <li>• .....</li> <li>• .....</li> <li>• Strong sense of hearing.</li> </ul>	<ul style="list-style-type: none"> <li>• Living in a burrow.</li> <li>• Eat different kinds of food.</li> </ul>
Bull shark :	<ul style="list-style-type: none"> <li>• .....</li> <li>• .....</li> <li>• .....</li> </ul>	<ul style="list-style-type: none"> <li>• Eat different kinds of food.</li> <li>• .....</li> </ul>

## Activity 5 | The Panther Chameleon

- **Lizards** are from **reptiles** that are an ancient type of animals found all over the world in different environments.
- Bodies of reptiles are covered with **scales** such as starred agama lizard and panther chameleon.

### Adaptation of the panther chameleon to survive in its environment :

- **Habitat :**

Tropical rainforest.

- **Structural adaptation :**

**Chameleon eyes can face opposite directions**, where each eye can move independently from the other, so :

- One eye can search for food like insects, while the other eye looks out for danger in a different direction.

**Chameleon has V-shaped feet and a tail like a hand to hold tightly the branches of trees.**

**Chameleon has brightly colored scales** to help it make camouflage and hide between green leaves and colorful flowers.



- **Behavioral adaptation :**

- When chameleon finds itself in danger, it doesn't have teeth or claws for defense, but it can scare its enemies by some other tricks such as :

**1 It puffs up its body with air.**



**2 It opens its mouth wide.**



**3 It changes the colors of its scales.**



lizards

reptiles

panther chameleon

independently

السحالي

الزواحف

حرباء النمر

بشكل مستقل

hold tightly

last trick

tropical rainforest

تمسّك بـحكام

الحيلة الأخيرة

الغابات الاستوائية المطيرة

خوف

ينتفخ

مخالب

scare

puff up

claws


**Give reason for ...**

**The panther chameleon can hunt its prey and avoid becoming a prey at the same time.**

Because it can search for food with one eye, while its other eye looks out for danger in a different direction.


**Check your understanding**

- Complete the following table which describes the types of adaptations that help chameleon to survive [put (s) for structural and (B) for behavioral] :

Adaptation	Type of adaptation	This adaptation helps chameleon to .....
Bright colored scales.	.....	Camouflage to hunt and hide.
V-shaped like feet.	.....	Balance and move.
Eyes move in different directions.	.....	Hunt.
Puffing up its body.	.....	Scare its enemies.
Changing colors.	.....	Defend or survive.

# Exercises on Lesson 2 (Part A)

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. The color of fur of fennec fox protects it from .....
  - a. wind.
  - b. rains.
  - c. hot climate.
  - d. cold weather.
- 2. Fennec fox has a tan-colored coat that provides ..... in its environment.
  - a. camouflage
  - b. respiration
  - c. panting
  - d. communication
- 3. Panting in fennec fox belongs to ..... adaptation. *(Fayoum 2022)*
  - a. only structural
  - b. only behavioral
  - c. both structural and behavioral
  - d. neither structural nor behavioral
- 4. Fennec fox and arctic fox live in burrows, this belongs to ..... adaptation.
  - a. only structural
  - b. only behavioral
  - c. both structural and behavioral
  - d. neither structural nor behavioral
- 5. All of the following properties help fennec fox to stay cool, except .....
  - a. thick fur coat.
  - b. make panting.
  - c. tan-colored coat.
  - d. extra-large ears.
- 6. Changing the color of body coat of arctic fox according to season, is considered as a type of ..... *(Beni-Suef 2023)*
  - a. behavioral adaptation.
  - b. changing the way of breathing.
  - c. structural adaptation.
  - d. changing the way of drinking.
- 7. All of the following properties help arctic fox to stay warm, except .....
  - a. thick fur coat.
  - b. short ears.
  - c. tan-colored coat.
  - d. short legs. *(Qena 2022)*
- 8. Both fennec fox and arctic fox are similar in all of the following, except .....
  - a. they live in the same habitat.
  - b. they can eat different things.
  - c. they have excellent hearing ability.
  - d. they have different sized ears.
- 9. All of the following sentences represent the meaning of adaptation, except .....
  - a. it is the characteristic that helps living things survive.
  - b. it is the characteristic that helps living things reproduce.
  - c. it is the change that helps the animal to find a prey.
  - d. it is the change that causes the death of the animal.

10. Bull sharks can live in ..... (Giza 2023)
- fresh water only.
  - salt water only.
  - seas, rivers and mud.
  - rivers, seas and oceans.
11. One of structural adaptations of bull sharks is that they .....
- can live in both salt water and fresh water.
  - are flexible about what they eat.
  - hunt in the day as well as the night.
  - can live in salt water only.
12. When a panther chameleon stands within leaves of trees, the color of its scales changes into ..... color.
- white
  - green
  - blue
  - black
13. Special eyes of the panther chameleon belong to ..... adaptation.
- only structural
  - only behavioral
  - both structural and behavioral
  - neither structural nor behavioral
14. ..... is considered as a behavioral adaptation in the panther chameleon. (Giza 2023)
- Puffing up its body during danger
  - Each eye can move independently
  - V-shaped feet
  - Tail like a hand
15. All the following are structural adaptations in the panther chameleon, except .....
- each eye can move independently.
  - openning its mouth wide during danger.
  - its V-shaped feet.
  - its tail like a hand.

**2 Choose from columns (B) and (C) what suit them in column (A) :**

(A) Animal	(B) Adaptation	(C) Helps it to ...
1. Chameleon	a. short ears and legs	A. stay cool
2. Fennec fox	b. V-shaped feet	B. stay warm
3. Arctic fox	c. different body colors	C. balance and move
4. Bull shark	d. panting	D. hide from its prey

1. .... → ....

2. .... → ....

3. .... → ....

4. .... → ....

**3 Put (✓) or (✗) :**

- 1. Living organisms can adapt their environmental conditions through structural adaptation and behavioral adaptation. (*Menofia 2022*) ( )
- 2. The behavioral adaptation is a change in the body structure of a living organism to survive. (*Darnietta 2023*) ( )
- 3. When the snow melts in polar regions, the thick fur coat of arctic fox turns black. ( )
- 4. The ears of arctic fox are larger than those of fennec fox. (*Sohag 2023*) ( )
- 5. Fennec fox stays in burrows during day, while arctic fox stays in burrows at night. ( )
- 6. Both fennec and arctic foxes can eat insects, fruit, plant roots and the remains from other animal's prey. ( )
- 7. Fennec fox has sandy-colored fur to help it make camouflage. ( )
- 8. Arctic fox lives in tundra, while fennec fox lives in hot desert. ( )
- 9. Panting and staying in burrows are considered behavioral adaptations in fennec fox. ( )
- 10. All types of sharks live in fresh water. (*North Sinai 2023*) ( )
- 11. If a bull shark moves from a river to a sea, it will die. ( )
- 12. Bull shark uses countershading camouflage to sneak up on its prey. ( )
- 13. Chameleon uses its tail and V-shaped feet to hunt and move. ( )
- 14. The panther chameleon has teeth and claws, through which it can hunt and eat its prey. ( )
- 15. Starred agama lizard use one of its eyes to search for food and the other one to look out for danger. ( )

**4 Complete the following table :**

<b>Animal</b>	<b>Its adaptation</b>	<b>Structural or Behavioral adaptation</b>
1. ....	Has blood vessels weave around each other.	.....
2. Polar bear	Has thick white fur.	Structural
3. ..... fox	Changes the color of its fur.	.....
4. ..... fox	Hiding inside burrows to stay cool.	.....
5. Panther chameleon	Has eyes face opposite directions.	.....

**5 Write the scientific term of each of the following :**

- 1. A change in the body structure of a living organism to survive. (.....)
- 2. A change in the behaviors or acts of a living organism to survive. (.....)
- 3. A type of foxes has a tan-colored fur. (*Behiera 2023*) (.....)
- 4. A way by which fennec fox cools itself like dogs. (.....)
- 5. A type of foxes that changes its fur color between winter and summer seasons. (.....)
- 6. A lizard that has different bright colored scales to provide camouflage in its environment and has V-shaped feet. (.....)
- 7. A shape of feet by which a panther chameleon holds tightly to branches of trees. (.....)
- 8. A feature in the bull shark, in which the upper surface of its body is darker than its lower surface. (.....)

**6 Complete the following sentences :**

- 1. Weaving of blood vessels around each other in penguin's feet is considered ..... adaptation, while migration of birds to certain regions is considered ..... adaptation. (*Assiut 2022*)
- 2. Tan-colored coat in fennec fox is considered ..... adaptation, while its panting to stay cool is considered ..... adaptation. (*Cairo 2023*)
- 3. Among animals that live in hot environments are ..... foxes, while ..... foxes live in cold environments.
- 4. Extra-large ears allow heat to escape to cool the bodies of ..... foxes, while short ears and legs help the ..... foxes stay warm.
- 5. Short ears of arctic fox is considered ..... adaptation, while its staying in burrows to be warm is considered ..... adaptation. (*Qena 2023*)
- 6. A burrow is an excellent place for the ..... fox to stay warm at night and for the ..... fox to stay cool during the day.
- 7. The fur color of arctic fox is ..... in winter but turns ..... in summer.
- 8. The chance of bull shark to find a prey is more easier in ..... water than in ..... water.
- 9. Countershading strategy of the bull shark is considered ..... adaptation.
- 10. Eyes of chameleon move independently of each other, this is considered as ..... adaptation. (*Behira 2022*)

- 11. Chameleon puffs up its body with air for defense which is considered ..... adaptation, while its V-shaped feet is considered ..... adaptation.

(Giza 2023 / Cairo 2023)

### 7 Give reasons for :

- 1. Fennec fox has a tan-colored coat.  
.....
- 2. Fennec fox undergoes panting.  
.....
- 3. Arctic fox has a thick fur coat.  
.....
- 4. The fur of arctic fox is white during winter but it turns brown in summer.  
.....
- 5. Burrows are excellent places for arctic and fennec foxes.  
.....

6. Fennec fox has extra-large ears, while arctic fox has short ears. (Menofia 2023)

- 7. Bull sharks have less competition for finding food in fresh water.  
.....
- 8. Panther chameleon has V-shaped feet and a long tail. (Assiut 2023)  
.....

### 8 What happens if ... ?

- 1. Arctic fox has a brown coat during winter but it turns white during summer.  
.....
- 2. Fennec fox has short ears.  
.....
- 3. Sense of hearing becomes weak in foxes.  
.....
- 4. Arctic fox has only a white coat during all seasons of the year.  
.....

5. Both eyes of panther chameleon move in one direction only.

6. Panther chameleon is exposed to danger.

**9** Cross out the odd word :

1. Penguin – Polar bear – Fennec fox – Arctic fox. (Sohag 2023) (.....)

2. Fennec fox – Starred agama lizard – Panther chameleon – Bull shark. (.....)

3. Panther chameleon – Polar bear – Fennec fox – Arctic fox. (.....)

**10** Compare between :

Points of comparison	Fennec fox	Arctic fox
1. Habitat :	.....	.....
2. Color of fur :	.....	.....
3. Shape of ears :	.....	.....
4. Time of hiding in burrows :	.....	.....

**11** Put (S) in front of structural adaptation and (B) in front of behavioral adaptation for each of the following statements :

1. Tan-colored coat of fennec fox. (.....)
2. Living of the arctic fox in burrows. (.....)
3. Living of bull shark in both salt water and fresh water. (.....)
4. Countershading of bull shark. (.....)
5. V-shaped feet of panther chameleon. (.....)
6. Change the colors of panther chameleon scales in danger cases. (.....)

**12** Give only one example of behavioral adaptation in each of the following animals :

- 1. Fennec fox : .....
- 2. Starred agama lizard : .....
- 3. Bull shark : .....
- 4. Panther chameleon : .....

**13** Look at the following figures, then answer the questions :



Figure (1)



Figure (2)

1. What is the name of this animal and where does this animal live ?

.....  
2. Figure (1) represents this animal in ..... season, while figure (2) represents this animal in ..... season.

3. Why does the fur color of this animal change between summer and winter seasons ?

.....  
4. Mention one structural adaptation and one behavioral adaptation in this animal to adapt and survive in its environment :

- Structural adaptation :

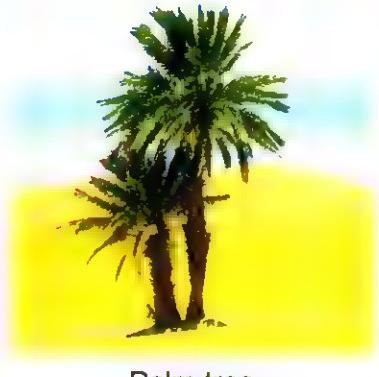
- Behavioral adaptation :

# LESSON TWO [Part B]

## Activity 6 Plant Adaptations

► Look at the opposite picture, then put (✓) or (✗) :

1. Palm tree is adapted to grow and survive in rainforest habitat. ( )



Palm tree

2. Plants have adaptations like animals to be able to survive in different environments. ( )

- Plants can grow in every place that sunlight shines, even the bottom of sea ice in polar regions has tiny plants growing on it.
- Like animals, plants have structural and behavioral adaptations that help them survive and grow in their different environments.

► Now, we will study two different big trees that grow in two different environments which are **Savannah** and **Amazon rainforest**.

### Savannah

Such as **Southern African Savannah**.

- It is a **grassland** habitat with a **mild temperature**.
- It is characterized by **extreme lack of water** during the dry season.
- **Acacia tree** is a big tree that grows in Savannah.
- Most large plants cannot grow in this habitat due to drought conditions, as the dry season lasts half of the year.



### Amazon rainforest

Such as **Amazon rainforest of Brazil**.

- It is rainy most of the year, so it is **easy to find water**.
- It is characterized by **strong winds**.
- **Kapok tree** is a big tree that grows in Amazon rainforest.
- It is hard for some plants in this habitat to reach sunlight due to the extra tall trees growing up to 70 meters tall.



savannah

Amazon rainforest

kapok tree

grassland

السافانا

غابات الأمازون المطيرة

شجرة الكابوك

المزارع

drought conditions

lack of water

acacia tree

ظروف الجفاف

نقص المياه

شجرة السنط

strong winds

mild temperature

scatter

رياح شديدة

درجة حرارة معتدلة

مبعد

## Adaptation of the two different big trees to survive in their different environments :

### 1 Acacia tree (umbrella-shaped tree)

- Acacia is adapted to survive through many months of drought in its environment as follows :

- Habitat :**

Southern African Savannah.

- Structural adaptation :**

#### Leaves

- Tiny leaves grow on the top of the tree to help them hold in water, while soaking up (absorbing) sunlight needed to make food.
- There are sharp spines around the leaves to prevent animals from eating these leaves.



Acacia tree



Leaves of  
Acacia tree

#### Trunk

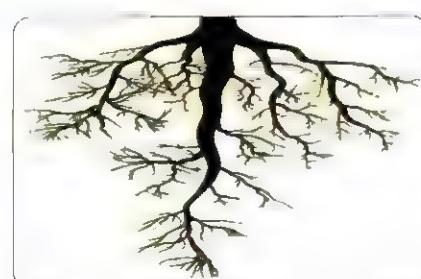
- A very long trunk, so most animals except giraffe cannot reach its leaves to feed on.

#### Note

The trunk in acacia tree stores water as the hump in the camel stores fat.

#### Root

- A very long root called **taproot** that grows directly downward to search for water as deep as 35 meters below the soil surface.



Taproot

- Behavioral adaptation :**

#### Acacia tree can defend itself as follows :

- It produces a poison when an animal begins eating its leaves to make the leaves taste very bad to keep this animal away.
- It sends a smelly message in the wind to warn other acacia trees nearby telling them to start making the same poison.

tiny leaves  
sharp spines  
send  
nearby

أوراق صغيرة  
أشواك حادة  
يرسل  
بالقرب من

soak up  
trunk  
produce  
smelly message

يحتضن  
جذع  
ينتج  
رسالة ذات رائحة

hump  
taproot  
poison

سنام  
جلد رئيسى  
سم

## 2 Kapok tree (umbrella-shaped tree)

- Kapok is adapted to survive in its environment through structural and behavioral adaptations as follows :
- Habitat : Amazon rainforest of Brazil.**
- Structural adaptation :**

### Leaves

**Hand-shaped leaves with narrow parts** to allow wind to move more gently through the leaves without tearing them.



Kapok tree

### Roots

- Large, wide roots called **buttress roots**.
- Buttress roots are not planted deeply in the ground but they grow high up on its trunk to hold the tree firmly in the **soggy soil (wet muddy soil)**.



Kapok leaves



Buttress roots



Kapok tree

### Note

Buttress roots can start up to 5 meters above the ground.



Kapok flowers and seeds

### Seeds

- Kapok tree has **fluffy yellow seeds** to be easily carried by wind across the forest.
- Behavioral adaptation :**
- Kapok tree has **delicious-smelling flowers** to send messages through wind to attract **bats** towards it.



### Check your understanding

#### ► Choose the correct answer :

- Sending a smelly message from acacia tree to warn other acacia trees is considered ..... adaptation.
  - a. only structural
  - b. only behavioral
  - c. both structural and behavioral
  - d. neither structural nor behavioral
- A structural adaptation of kapok tree is that ..... .
  - it has delicious-smelling flowers.
  - it has buttress roots.
  - it has sharp spines around its leaves.
  - it has a long taproot.

narrow parts  
buttress roots  
fluffy

الأجزاء الضيقة  
جذور داعمة  
ثقيل

delicious-smelling flowers  
زهور ذات رائحة طيبة  
軽く

soggy soil  
firmly  
بلطف

زهور ذات رائحة طيبة  
بلطف

نرية رطبة  
بحزم

## Activity 7 Plant Scientist

- The scientist who studies plants is known as "botanist".
- Plants have different properties that help them to adapt and survive in their different environments through their structural adaptations as we will study in the following examples :

Plant	Habitat	Structural adaptation	Reason
 Mangrove tree	Salt water	It has long and strong roots.	To resist the water waves.
 Water lily	Wetland (Fresh water)	It has wide floating leaves.	To absorb a large amount of sunlight.
 Pine tree	Snow	<b>The pine tree has :</b> <ul style="list-style-type: none"> <li>- a triangular shape and short branches.</li> <li>- needle leaves.</li> </ul>	<ul style="list-style-type: none"> <li>- To allow the snow to slide easily over it, so its branches don't break.</li> <li>- To prevent the loss of water.</li> </ul>
 Palm tree	Desert	- It has thick roots and small leaves.	To resist the strong winds.

botanist  
resist  
water lily

عالم النبات  
يقاوم  
زبد الماء / الملوث

شجرة الصنوبر  
شجرة المانجو  
أمواج الماء

أرض رطبة  
شجرة التحليل  
أوراق إبرية

pine tree  
mangrove tree  
water waves

wetland-  
palm tree  
needle leaves



Barbary fig

Desert

It has sharp spines and tough outer cover.



To prevent animals from eating its leaves and fruits.

► From the previous table, we can conclude that :

- All plants have roots, stems (trunks) and leaves.
- Plants differ in the structure and shape of their roots, stems and leaves to adapt the environmental conditions to survive and grow in their environments.

### What happens if ... ?

Plants were placed in different environment.

These plants may die or may adapt the new environmental conditions to survive and grow in their new environments.



### Check your understanding

► Put (✓) or (✗) :

1. Palm tree has short roots and big leaves. ( )
2. Water lily plant lives in salt water. ( )
3. Mangrove tree has long and strong roots to help the plant to resist the water waves. ( )

In the Assessment Book :

Try to answer :

Self-Assessment (2)

# Exercises on Lesson 2 (Part B)

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. It is difficult for rainforest plants to get .....
  - a. water.
  - b. air.
  - c. sunlight.
  - d. oxygen.
- 2. One of the behavioral adaptations of acacia tree is that ..... (Alex. 2023)
  - a. it has one very long root.
  - b. it has sharp spines around its leaves.
  - c. it has very tall trunk.
  - d. it produces a poison to make bad tasty leaves.
- 3. Acacia tree trunk and camel hump, .....
  - a. both store water.
  - b. both store fat.
  - c. the first stores fat and the second stores water.
  - d. the first stores water and the second stores fat.
- 4. All of the following properties protect acacia leaves from being eaten by animals, except that ..... (Minia 2022)
  - a. they are high enough.
  - b. they are surrounded by sharp spines.
  - c. they are brightly colored.
  - d. they produce a poison.
- 5. The acacia tree warns the other nearby acacia trees from animals by sending .....
  - a. a watery message in the air.
  - b. a watery message in the water.
  - c. a smelly message in the air.
  - d. a smelly message in the water.
- 6. When the nearby acacia trees receive the smelly message from the acacia tree, which exposed to be eaten by animals, they start to .....
  - a. lose water from their trunks.
  - b. invite bats to eat their leaves.
  - c. make a poisonous substance in their leaves.
  - d. fall down their leaves.
- 7. Savannah is characterized by all of the following, except .....
  - a. it is a grassland habitat.
  - b. it is rainy most of the year.
  - c. it has a mild temperature.
  - d. it has extreme lack of water.

8. From umbrella-shaped trees are ..... (Cairo 2023)
- mangrove tree and acacia tree.
  - mangrove tree and kapok tree.
  - acacia tree and kapok tree.
  - barbary fig and water lily.
9. The roots of kapok tree are not planted deeply in the soil, because .....
- the soil contains less water.
  - the soil contains more water.
  - the climate is very cold.
  - the climate is very hot.
10. Kapok tree uses the wind to carry its fluffy yellow seeds across its .....
- desert habitat.
  - snowy habitat.
  - salt water habitat.
  - rainforest habitat.
11. If a plant grows in a dry desert, it needs ..... to adapt for getting water.
- long branches
  - long leaves
  - long roots
  - more sunlight
12. If a plant grows in a rainforest, where it is hard to reach sunlight, so it needs ..... to adapt for getting more sunlight.
- small roots
  - a very tall trunk
  - sharp spines
  - a very short trunk
13. If a plant grows in a snow habitat, so it needs all of the following characteristics, except ..... to adapt this habitat.
- short branches
  - triangular shape
  - needle leaves
  - wide leaves
14. All of the following are adaptations of different plants to keep animals away from them, except that they .....
- produce poison.
  - gather their branches high above.
  - have delicious-smelling flowers.
  - have sharp spines.
15. Desert plants are characterized by all of the following, except that they .....
- store water.
  - have wide leaves.
  - have long roots.
  - have sharp spines.
16. Palm tree has tiny leaves like .....
- pine tree.
  - kapok tree.
  - acacia tree.
  - water lily plant.
17. One of the structural adaptations of water lily plant is that ..... (Giza 2022/2023)
- it has long roots.
  - it has sharp spines.
  - it has tiny leaves.
  - it has wide leaves.

- 18. Mangrove tree has long and strong roots to ..... (Sharkia 2023)
  - a. resist the strong wind.
  - b. resist the water waves.
  - c. prevent the loss of water.
  - d. absorb the underground water.
  
- 19. Pine tree has a triangular shape to make snow slides over its branches without breaking it. This structural adaptation makes this tree face the extreme cold climate like the feet of .....
  - a. caracal.
  - b. penguin.
  - c. fennec fox.
  - d. brown bear.
  
- 20. Barbary fig keeps animals away like acacia trees by its .....
  - a. sharp spines.
  - b. poison.
  - c. smell.
  - d. long leaves.

**2 Choose from column (B) what suits it in column (A) :**

(A)	(B)
1. Long and strong roots	a. prevent animals from eating barbary fig.
2. Wide leaves	b. make mangrove tree resists the water waves.
3. Needle shaped leaves	c. carries the kapok tree's fluffy yellow seeds across the forest.
4. Sharp spines	d. allow wind to move more gently through the leaves of kapok tree.
5. Hand-shaped leaves	e. allow water lilies absorb large amount of sunlight.
	f. prevent the loss of water in pine tree.

1. .... 2. .... 3. .... 4. .... 5. ....

**3 Put (✓) or (✗) :**

- 1. Plants have structural adaptation only to help them survive and grow in different environments. (Fayoum 2022) ( )
  
- 2. The rain falls for 6 months in Southern African Savannah. ( )
  
- 3. The taproot of acacia tree grows deeply downward searching for water. ( )
  
- 4. Acacia leaves are protected from being eaten by animals as they have brightly colored leaves. ( )
  
- 5. Acacia tree and kapok tree use wind to send messages. ( )
  
- 6. Acacia tree has delicious-smelling flowers to attract bats towards it. ( )
  
- 7. Hand-shaped leaves of kapok tree is considered as a behavioral adaptation. (Minia 2023) ( )

- 8. Kapok tree produces fluffy yellow seeds, this is considered as a structural adaptation. ( )
- 9. One of the structural adaptations of acacia tree is that it has large, wide roots called buttress roots. (Sohag 2023) ( )
- 10. Mangrove trees adapt to resist the water waves through their long, strong roots. (Sharkia 2022) ( )
- 11. Water lily has wide leaves to absorb a large amount of sunlight. ( )
- 12. Pine trees that live in desert habitat have needle leaves to prevent the loss of water. ( )
- 13. Having thick roots is a behavioral adaptation of palm trees to resist strong winds. ( )
- 14. Animals can't eat barbary fig due to its sharp spines. ( )
- 15. Plants of dry desert habitat adapt to store water. ( )
- 16. Some plants have sharp spines to absorb a large amount of sunlight. ( )

**4 Write the scientific term of each of the following :**

- 1. A tree that grows in Southern African Savannah and it has sharp spines around its leaves. (.....)
- 2. A structural adaptation of acacia tree that allows it to search for water. (.....)
- 3. A structural adaptation that surrounds the leaves of acacia tree to prevent animals from eating them. (.....)
- 4. A tree that grows in Amazon rainforest of Brazil and it has hand-shaped leaves. (.....)
- 5. A structural adaptation that fixes the kapok tree in soggy soil and support its trunk. (Red Sea 2023) (.....)
- 6. The part of the kapok tree which is supported by the buttress roots. (.....)
- 7. A tree lives in salt water habitat and has long, strong roots to resist the water waves. (.....)
- 8. A plant lives in wetland habitat and it has wide leaves to absorb a large amount of sunlight. (.....)
- 9. A structural adaptation in water lilies that helps them absorb a large amount of sunlight. (.....)
- 10. A structure that prevents the loss of water in the pine tree. (.....)

**5 Complete the following sentences :**

- 1. Acacia tree defends itself by producing ..... that makes leaves taste terrible, while chameleon defends itself by puffing up its ..... with air.
- 2. Kapok tree grows in Amazon rainforest habitat which has ..... soil.
- 3. The hand-shaped leaves of kapok tree allow ..... to flow through them gently. (Gharbia 2023)
- 4. The kapok tree spreads the smell of its flowers to attract ..... towards it.
- 5. Among the plants that can survive in habitats that have lackage of water are ..... , ..... and .....
- 6. The leaves of ..... tree in hot weather habitat store water, while the needle leaves of ..... tree in snowy habitat prevent the loss of water.
- 7. The leaves of water lilies are wide in order to ..... on the water surface and to absorb a large amount of ..... (Ismailia 2022)
- 8. Drought regions are characterized by lacking of ..... so, their plants adapt by having very long .....
- 9. The structural adaptation of ..... tree can resist water waves, while the structural adaptation of ..... tree can resist strong winds.
- 10. The leaves of ..... plant allow it to absorb a large amount of sunlight, while the leaves of ..... tree allow wind to move easily through these leaves without tearing them.

**6 Give reasons for :**

- 1. Branches of acacia tree gather on the top of its trunk.
- .....  
.....

- 2. Acacia tree has sharp spines around its leaves.
- .....  
.....

- 3. Wind is important to acacia tree.
- .....  
.....

- 4. Kapok tree has hand-shaped leaves.
- .....  
.....

- 5. Kapok trees stay firmly rooted in the soggy soil although they are very tall.
- .....  
.....

- 6. Pine tree has a triangular shape and short branches.
- 7. Water lilies have wide floating leaves. (Sharkia 2022)
- 8. Mangrove tree has long and strong roots. (Cairo 2023)
- 9. Palm trees have thick roots and small leaves.
- 10. Barbary fig has sharp spines. (Sharkia 2023)

### 7 What happens if ... ?

1. The length of acacia taproot doesn't exceed 3 meters downward.

2. The acacia leaves are not guarded by sharp spines.

3. There are no buttress roots in the kapok tree.

4. The pine tree has an umbrella shape not a triangle shape.

5. Some plants of rainforest habitat became very short.

6. Water lily has narrow leaves instead of wide leaves.

7. Palm tree has thin roots and large leaves.

### 8 Cross out the odd word :

- 1. Taproot – Tiny leaves – Buttress roots – Producing a poison. (.....)
- 2. Taproot – Hand-shaped leaves – Soggy soil – Buttress roots. (.....)
- 3. Cactus plant – Barbary fig – Palm tree – Mangrove tree. (.....)
- 4. Acacia tree – Polar bear – Penguin – Pine tree. (.....)

**9 Compare between :**

1.

Points of comparison	Acacia tree	Kapok tree
1. Type of roots :	.....	.....
2. Shape of leaves :	.....	.....

2.

Points of comparison	Kapok tree	Water lily plant	Pine tree
1. Habitat :	.....	.....	.....
2. Shape of leaves :	.....	.....	.....

**10 Classify the following living organisms according to their habitats into organisms****live in deserts and organisms live in forests in the table below :**(Starred agama lizard – Panther chameleon – Fennec fox – Kapok tree –  
Palm tree – Barbary fig plant)

Organisms live in deserts	Organisms live in forests
.....	.....
.....	.....
.....	.....
.....	.....

# LESSON THREE

## Activity 8 Digestive System

► Look at the following figures, then complete the sentences below :



Figure (1)

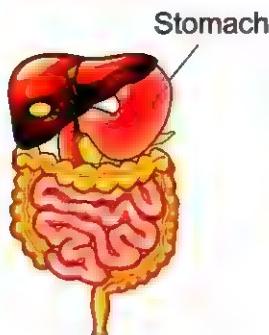


Figure (2)

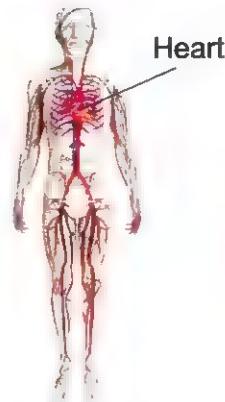
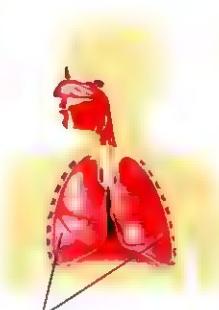


Figure (3)



Two lungs

Figure (4)

1. Figure ..... represents the human digestive system.
2. Figure ..... represents the human respiratory system.

## How do body systems adapt to meet the needs of living organisms ?

- Each living organism has different ways to adapt to live in its environment, so :
  - The body of a living organism (human or animal) is made up of systems such as digestive system, respiratory system, nervous system, .... etc.

### System :

It is a group of organs that work together to perform a specific job (function).

### Note

Digestive system and respiratory system are working together to get energy from food and breathing.

### ► In this lesson, we will study :

- Human digestive system.
- Human respiratory system.
- Why do we need to eat food ?  
"Because food contains different nutrients (Vitamins, proteins, .. etc.) that give us energy to :
  - do activities as walking, talking and even during sleeping.
  - do body function as heart beating, breathing and thinking.

brain  
stomach  
heart  
nutrients  
heart beating

المخ  
المعدة  
القلب  
العناصر الغذائية  
نبض القلب

two lungs  
specific job  
digestive system  
organs

الرئتين  
وظيفة محددة  
الجهاز الهضمي  
أعضاء

energy  
breathing  
nervous system  
respiratory system

طاقة  
نفس  
الجهاز العصبي  
الجهاز التنفسى

### Note

In one day, your body needs a lot of energy, so :

- your heart beats around 100,000 times. - you breathe over 20,000 times.

## Human digestive system :

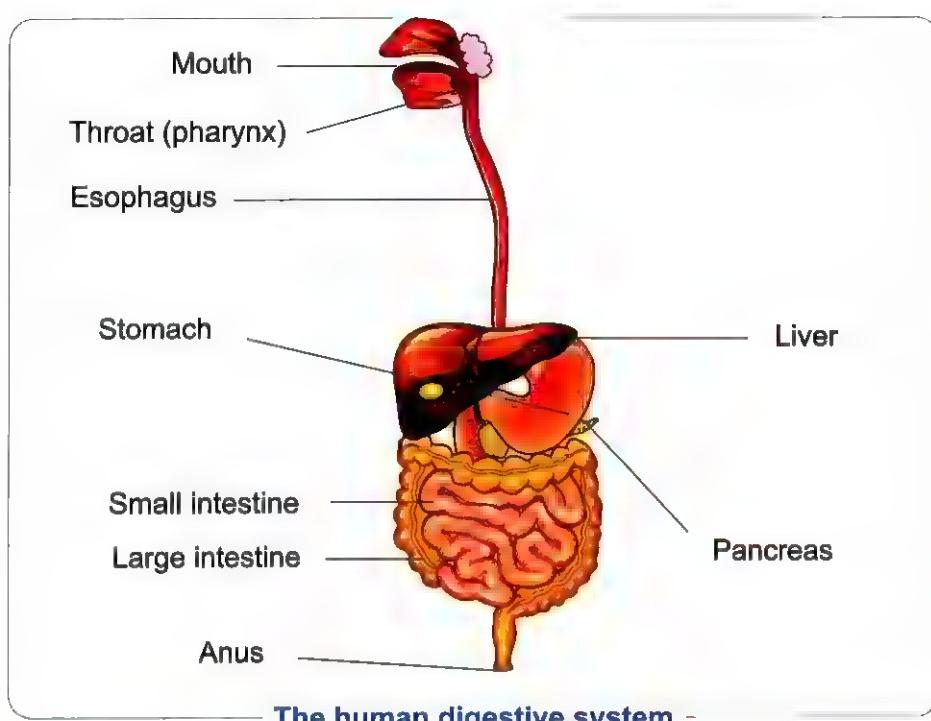
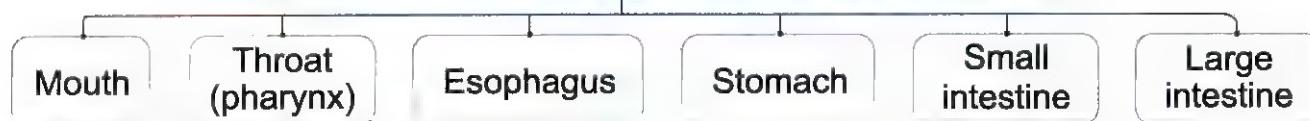
- The digestive system breaks down food into smaller parts that your body can use in a process called digestion process.

### Digestion process :

It is a process of breaking down food into smaller parts that the body cells absorb and use them to get energy and grow.

## The structure of the human digestive system :

The human digestive system consists of a group of organs that work together which are :



### Note

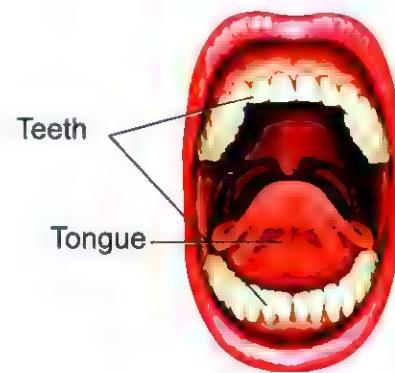
Digestive system starts with **mouth** and ends with **anus**.

digestion process	عملية الهضم	mouth	فم	liver	الكبد	large intestine	الأمعاء الغليظة
esophagus	المرأة	throat (pharynx)	البلعوم	pancreas	البنكرياس	anus	فتحة الشرج
body functions	وظائف الجسم	small intestine	الأمعاء الدقيقة				

## Description and function of organs of human digestive system :

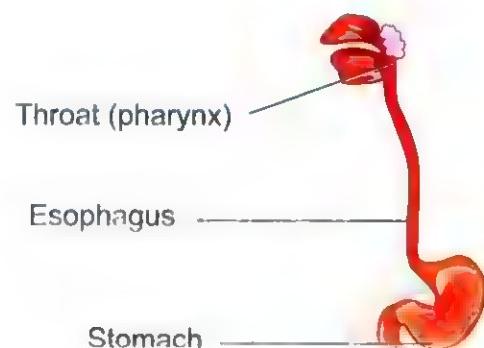
### Mouth

- Digestion process begins in the mouth.
- Mouth contains :**
  - Teeth** : They crush food during chewing
  - Saliva** : - It is a liquid substance in the mouth.  
- It moistens food and begins to break it down.
  - Tongue** : It mixes food with saliva in the mouth.



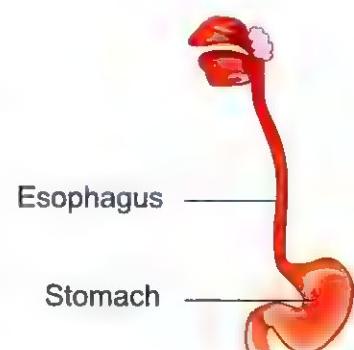
### Esophagus

- It is a long muscular tube.
- It allows the food to move from throat down into the stomach.



### Stomach

- It is a muscular organ.
- It mixes food with the stomach acid and digestive juices (enzymes) found in it to change the food into a soupy liquid.
- Food stays in the stomach for few hours, then the muscles of the stomach move the food into a long, winding tube called **small intestine**.



description  
saliva  
long muscular tube  
muscular organ

وصف  
اللعاب  
أنبوب عضلي طویل  
عضو عضلی

stomach acid  
enzymes  
function  
substance

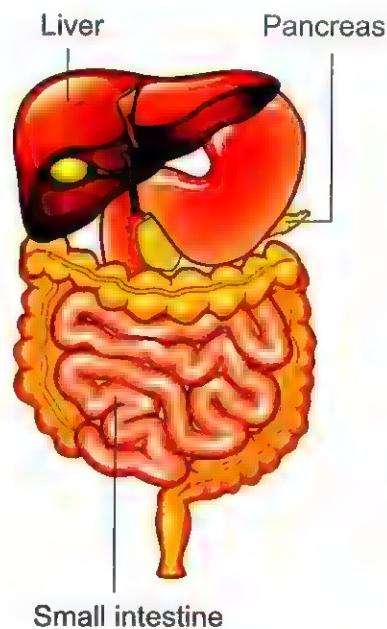
حمض المعدة  
أنزيمات  
وظيفة  
مادة

crush  
chew  
digestive juices  
moisten

سحق  
مضغ  
عصارات هضمية  
مبلل

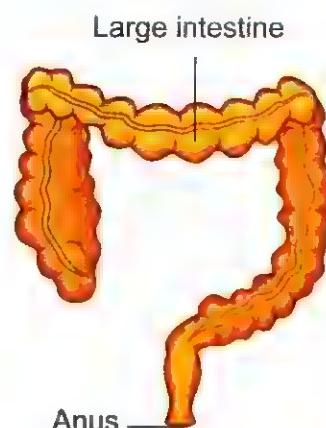
## Small intestine

- It is a long, winding tube as its length is more than six meters.
- The juices of **pancreas** and **liver** flow into the small intestine and help in breaking down the food into nutrients (or digested food).
  - The walls of the small intestine absorb these nutrients through tiny blood vessels to carry them to all body parts.
- The body does not benefit from some parts of food known as **undigested materials** that flow into the large intestine.



## Large intestine

- It is a tube that starts from the end of the small intestine and ends with the anus.
- It absorbs water from the undigested materials, so they become solid wastes that leave the body through the **anus**.
- There is no digestion process occurs in the large intestine.



### Note

The organs of the human digestive system have different structures to do different functions and this considered as structural adaptation.

## What happens if ... ?

**One of the organs of the digestive system is absent.**

The digestive system could not do its function correctly.

#### ► Comparison between the **functions** of the stomach, small intestine and large intestine :

The stomach	The small intestine	The large intestine
Mixing food with the acid and digestive juices to change it into a soupy liquid.	Breaking down of food into nutrients by the help of the juices of liver and pancreas.	Absorbing the water from undigested materials.



### **How can you keep the digestive system healthy ?**

1. Drinking a lot amount of water.
  2. Chewing the food well.
  3. Don't eat much fast meals.



## Check your understanding

► Put each of the following words in front of its suitable sentence :

( Stomach – Large intestine - Digestive system)

1. It mixes food with acid and digestive juices. ( ..... )
  2. A system that breaks down food into smaller parts. ( ..... )
  3. It absorbs water from the undigested materials. ( ..... )

يمكنك الاستمتاع بشرح هذا الدرس بطريقة  
محاسنة بـ "Augmented Reality" على "El-Moasser Digestive System 3D".

هاتفك الذكي أو جهاز اللوحي:

"El-Moasser Digestive System 3D"

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## Activity 9 Respiratory System

### Human respiratory system :

- Our bodies need oxygen in order to do their functions.
- We get oxygen gas from the air around us all the time.
- The respiratory system is the system responsible for breathing (respiration).
- The respiratory system supplies the body with oxygen gas and gets rid of carbon dioxide gas through the respiration process.



### Respiration process :

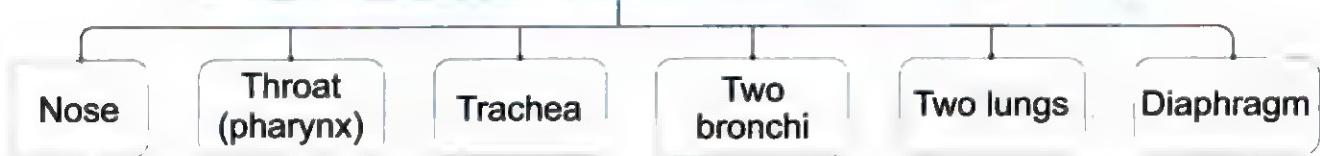
It is a process of pulling air in (inhalation) and pushing air out (exhalation) of the body.

#### Note

Carbon dioxide gas produced during respiration process is a waste product. carbon dioxide gas is harmful to our bodies so, we must expel it out during exhalation.

### The structure of the human respiratory system :

The human respiratory system consists of a group of organs that work together which are :



exhalation  
harmful  
nose

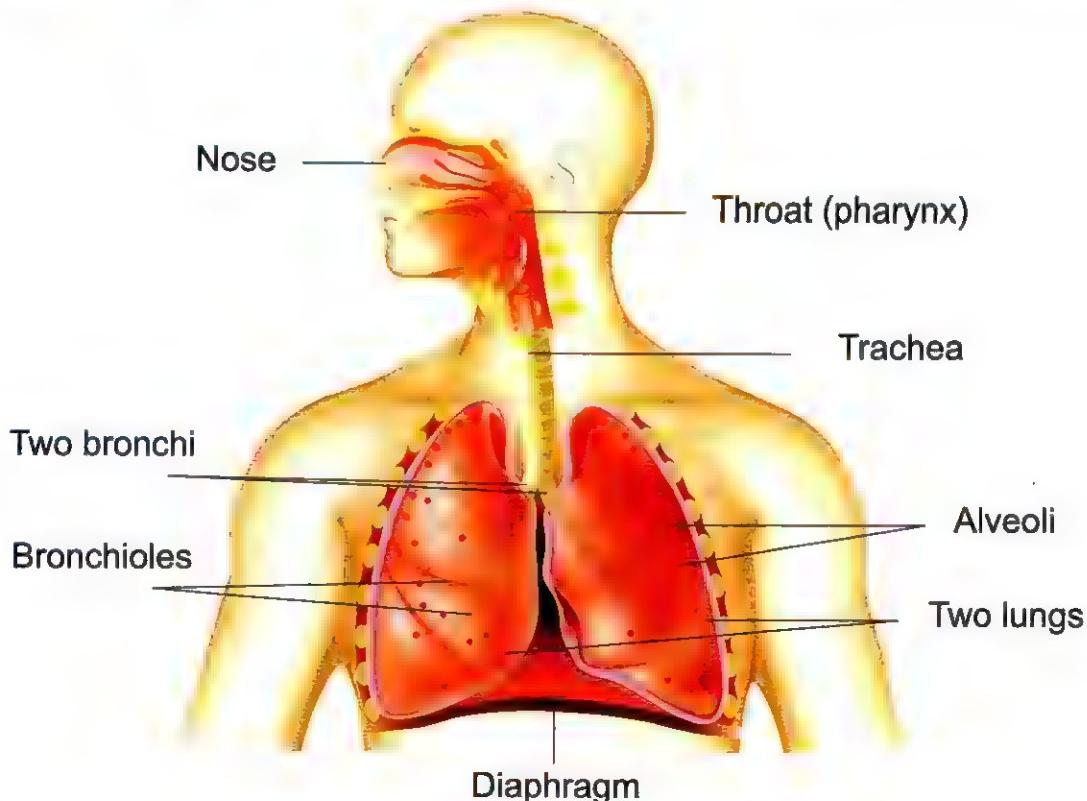
رفير  
شار  
ألف

trachea  
inhalation  
get rid of

القصبة الهوائية  
شهيق  
يتخلص من

expel out  
two bronchi  
diaphragm

يطرد  
الشعبتان الهوائيتان  
المجاذب الحاجز

**The human respiratory system**

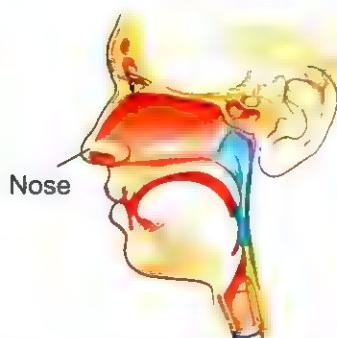
## How does the respiratory system work ?

### **Nose :**

It is the first organ of the respiratory system through which the air enters the body.

#### **Note**

The air can enter the body through the nose and the mouth.



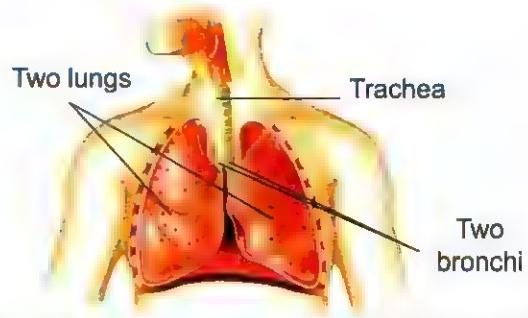
### **Throat :**

It allows the air to pass from the nose to the "trachea"

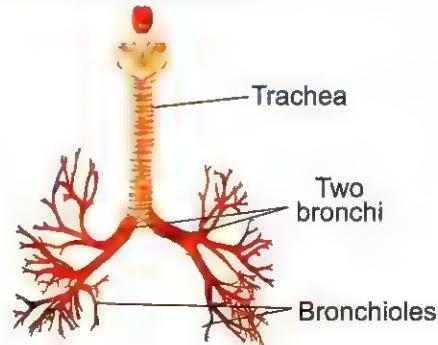


**Trachea :**

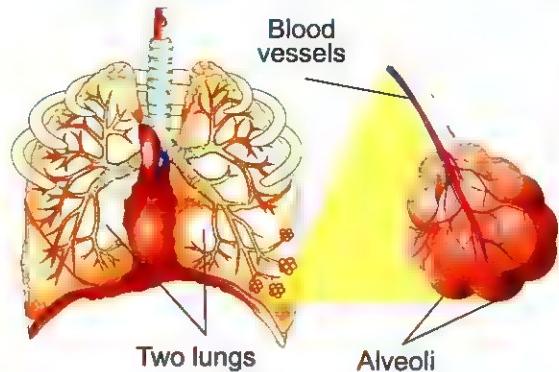
- It is a tube that allows air to pass into the "two lungs" which fill up with air like two balloons.
- Inside the lungs, the trachea is branched into two tubes known as "two bronchi"

**Two bronchi :**

- They allow the air to enter the two lungs.
- They are divided into smaller and smaller tubes that look like the branches of a tree known as "bronchioles".

**Two lungs :**

- Inside the lungs, the bronchioles end with little air sacs, surrounded by blood vessels known as "alveoli".
- Inside the blood vessels, oxygen moves into the blood which carries oxygen around the body to help other organs and systems to work.

**Diaphragm :**

- It is a large muscle at the base of ribs which plays an important role in inhalation and exhalation.


**Note**

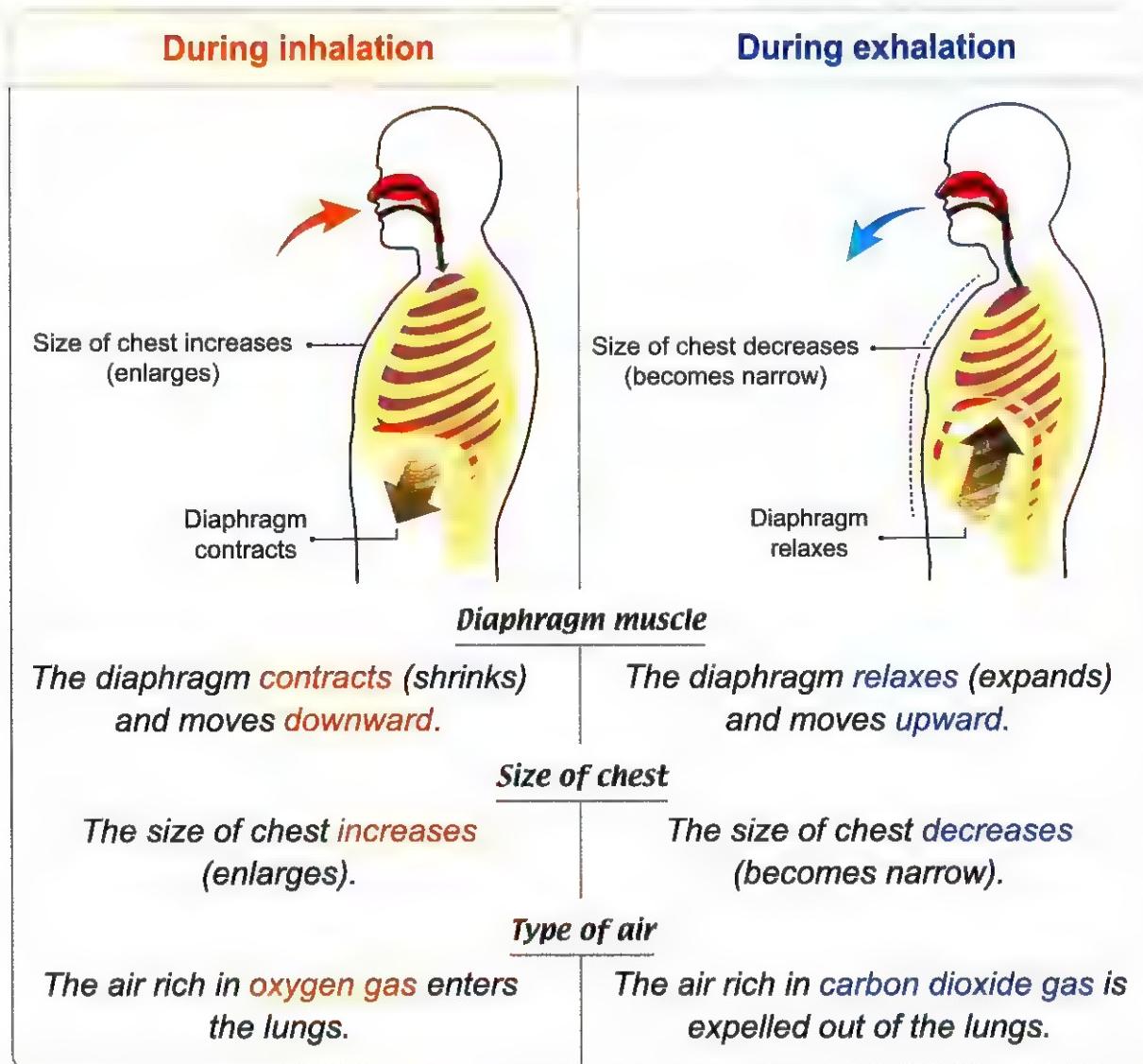
The organs of the human respiratory system have different structures to do different functions and this is considered as structural adaptation.

## How does the respiration process take place ?

**Respiration process includes :**

1. Inhalation (breathe in).
2. Exhalation (breathe out).

► Comparison between inhalation and exhalation :



### Explain ?

**How does the respiratory system get oxygen to the body cells ?**

Oxygen enters the lungs during inhalation, then the blood carries oxygen to all the body cells.



## Check your understanding

► Put (✓) or (✗) :

1. During inhalation, the diaphragm muscle relaxes and moves downward. ( )
2. Respiration process starts with mouth and ends with anus. ( )

► Complete :

1. Respiration process includes ..... and .....
2. The process of pulling air in and pushing air out of the body is called ..... process.

In the Assessment Book :

Try to answer :  
Self-Assessment (3)



**الازن**

يمكنك الاستمتاع بشرح هذا الدرس بطريقة  
مجسمة بـ "Augmented Reality" على "Augmented Reality"  
هاتفك الذكي أو جهازك اللوحي

"El-Moasser Respiratory System 3D"

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# Exercises on Lesson 3

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. The energy that the living organism needs to perform different functions is obtained from .....
  - a. breathing only.
  - b. food processing only.
  - c. breathing and running.
  - d. breathing and food processing.
- 2. All of the following are organs of the digestive system, except .....
  - a. mouth.
  - b. nose.
  - c. stomach.
  - d. esophagus.
- 3. Digestion process begins in the ..... (Giza 2023)
  - a. stomach.
  - b. esophagus.
  - c. mouth.
  - d. small intestine.
- 4. Which of the following organs does not share in breaking down of food ? .....
  - a. Mouth.
  - b. Stomach.
  - c. Lungs.
  - d. Small intestine.
- 5. Crushing the food in your mouth is the function of ..... (Behira 2022)
  - a. stomach.
  - b. tongue.
  - c. saliva.
  - d. teeth.
- 6. All of the following are correct about the mouth, except .....
  - a. it is the first organ in the digestive system.
  - b. it has teeth.
  - c. it has tongue.
  - d. it moves directly food to the stomach.
- 7. Saliva in the mouth makes the food become soft and mushy with the help of .....
  - a. teeth only.
  - b. tongue only.
  - c. teeth and esophagus.
  - d. teeth and tongue.
- 8. The throat is connected to the stomach through .....
  - a. esophagus.
  - b. trachea.
  - c. small intestine.
  - d. large intestine.
- 9. The organ that moves the food into the stomach is ..... (Alex. 2023)
  - a. mouth.
  - b. tongue.
  - c. esophagus.
  - d. small intestine.
- 10. The food passes from the stomach to the ..... directly.
  - a. esophagus
  - b. small intestine
  - c. large intestine
  - d. anus
- 11. The stomach mixes the food with ..... to help in digestion of food.
  - a. digestive juices only
  - b. stomach acid only
  - c. saliva and digestive juices
  - d. stomach acid and digestive juices

- 12. The liver and ..... pour their juices into the small intestine.
  - a. throat
  - b. esophagus
  - c. large intestine
  - d. pancreas
- 13. The long winding tube that its length is about more than six meters is called .....
  - a. large intestine.
  - b. small intestine.
  - c. esophagus.
  - d. stomach.
- 14. The undigested food pass from the small intestine into the ..... (Suez 2022)
  - a. liver.
  - b. pancreas.
  - c. brain.
  - d. large intestine.
- 15. In the large intestine, ..... is absorbed from the undigested food.
  - a. starch
  - b. fat
  - c. water
  - d. oil
- 16. The solid wastes of undigested food become useless to the body, so the body must expel them outside through the .....
  - a. mouth.
  - b. anus.
  - c. large intestine.
  - d. small intestine.
- 17. All organs of the human digestive system are considered as ..... adaptation.
  - a. only structural
  - b. only behavioral
  - c. structural and behavioral
  - d. neither structural nor behavioral
- 18. During inhalation, air enters through ..... then down the throat.
  - a. nose and trachea
  - b. nose and mouth
  - c. mouth and lungs
  - d. mouth and trachea
- 19. The passage of air during inhalation is ..... (Cairo 2023)
  - a. throat – nose – lungs – trachea.
  - b. trachea –throat –lungs – nose.
  - c. lungs – nose – throat – trachea.
  - d. nose – throat – trachea – lungs.
- 20. The throat is connected to the lungs through .....
  - a. esophagus.
  - b. trachea.
  - c. small intestine.
  - d. ribs.
- 21. Inside the two lungs, at the end of the smaller air passages (bronchioles) there are tiny air sacs surrounded by .....
  - a. air.
  - b. water.
  - c. small intestine.
  - d. blood vessels.
- 22. Inside the lungs, the trachea is branched into two tubes known as .....
  - a. alveoli.
  - b. air sacs.
  - c. bronchi.
  - d. blood vessels.
- 23. The oxygen gas moves from air into blood at the .....
  - a. nose.
  - b. throat.
  - c. trachea.
  - d. lungs.

- 24. All of the following happen during exhalation, except .....
  - a. diaphragm relaxes.
  - b. diaphragm contracts.
  - c. diaphragm moves upward.
  - d. the size of chest decreases.

**2 Choose from column (B) what suits it in column (A) :**

1.

(A)	(B)
1. Esophagus	a. absorbs water from the undigested food to become solid wastes.
2. Small intestine	b. mixes the food with an acid and digestive juices.
3. Large intestine	c. digestion begins in it.
4. Stomach	d. is a long winding tube, its length is more than 6 meters.
5. Mouth	e. is a muscular tube that moves the food down into the stomach.
	f. solid wastes leave the body through it.

1. .... 2. .... 3. .... 4. .... 5. ....

2.

(A)	(B)
1. Trachea	a. is a large muscle at the base of the ribs and helps in inhalation and exhalation.
2. Blood	b. are like balloons and they contain little sacs surrounded by blood vessels.
3. Diaphragm	c. carries oxygen to all the body organs.
4. Lungs	d. is a tube through which air travels down into the lungs.
	e. air enters the body through them.

1. .... 2. .... 3. .... 4. ....

**3 Put (✓) or (✗) :**

- 1. The digestive system consists of similar organs that work together to get nutrients from food. ( )
- 2. The human body gets oxygen gas from food. ( )
- 3. Mouth, nose, esophagus and stomach are from the organs of the digestive system. ( )
- 4. The food passes through the large intestine before it goes into the small intestine. (Sohag 2022) ( )

- 5. Digestion process begins in the stomach with the help of saliva. (Giza 2023) ( )
- 6. Tongue and teeth moisten the food, while saliva crushes the food until it becomes soft. ( )
- 7. Food passes from mouth to stomach through a narrow tube known as small intestine. (Qena 2022) ( )
- 8. Food usually stays in stomach for few hours until it becomes a soupy liquid. ( )
- 9. Stomach mixes the food with juices that come from liver and pancreas. ( )
- 10. The food gets broken down into nutrients in the small intestine. ( )
- 11. The walls of the small intestine absorb the nutrients through tiny blood vessels then blood carries them to all the body parts. ( )
- 12. Swallowing food without chewing keeps the digestive system healthy. ( )
- 13. Digestive system ends by anus. ( )
- 14. The air travels down into the lungs through esophagus. ( )
- 15. During inhalation, the size of chest becomes narrow. ( )
- 16. During exhalation, the diaphragm expands. (Sohag 2022) ( )
- 17. The inhaled air is rich in carbon dioxide gas, while the exhaled air is rich in oxygen gas. (Menofia 2023) ( )

#### 4 Write the scientific term of each of the following :

- 1. A system that helps in breaking down food into smaller parts. (.....)
- 2. A group of organs that work together to perform a specific job. (.....)
- 3. A process of breaking down food into smaller parts that the body cells absorb and use to get energy and grow. (Cairo 2023) (.....)
- 4. The organ, where the digestion process begins. (.....)
- 5. They present in the mouth and play an important role in crushing of food. (.....)
- 6. A liquid substance in your mouth that moistens the bite of food and begins to break it down. (.....)
- 7. The organ which receives the food from esophagus. (.....)
- 8. An organ that has tiny blood vessels to absorb the nutrients through its walls. (.....)
- 9. An organ through which solid wastes of digestion leave the body. (Luxor 2023) (.....)

- 10. A long muscular tube that moves the food down into the stomach. (.....)
- 11. A process of pulling air in and pushing air out of the body. (.....)
- 12. It allows the air to pass from the nose to the trachea. (Alex. 2023) (.....)
- 13. A tube that allows air to pass into the two lungs. (.....)
- 14. Little air sacs surrounded by blood vessels in the respiratory system. (.....)
- 15. A large muscle that contracts during breathing in and relaxes during breathing out. (Beni Suef 2022) (.....)

### 5 Complete the following sentences :

- 1. The human body uses ..... system to get nutrients from food and uses ..... system to get oxygen from air.
- 2. In order for food to become soft, the ..... and ..... work to mix and grind (crush) the food well.
- 3. In the digestive system, food becomes a soupy liquid in the ..... , while it breaks down into nutrients in .....
- 4. The ..... is a tube that has muscles to move the food down into the stomach, while ..... is a long winding tube, its length is more than six meters.
- 5. The longest part of the digestive system where most digestion takes place inside it is .....
- 6. The small intestine receives juices from ..... and ..... that help in digestion process.
- 7. The walls of the small intestine absorb the digested food and transfer it into your blood stream through .....
- 8. In the digestive system, ..... intestine absorbs the nutrients through its wall, while ..... intestine absorbs water from the undigested food.
- 9. Air enters and exits the human body through ..... system. (Cairo 2022)
- 10. Inside the lungs, the ..... end with little air sacs known as .....
- 11. During inhalation, air travels down from your throat to your lungs through ..... (Giza 2023)
- 12. At the base of your ribs, there is a large muscle that plays an important role in respiration process known as .....
- 13. During inhalation process, the diaphragm contracts and moves ....., while during exhalation process, the diaphragm expands and moves .....

(Menofia 2022)

**6 Give reasons for :**

- 1. The human body is made up of different systems.
- .....
- 2. The importance of juices of liver and pancreas.
- .....
- 3. Anus is an important organ in the digestive system.
- .....
- 4. The inhaled air differs from the exhaled air.
- (Suez 2023)
- .....
- 5. Diaphragm plays an important role in respiration process.
- .....

**7 What happens if ... ?**

- 1. The small intestine is removed from the human body.
- .....
- 2. The nutrients absorbed by the walls of small intestine enter the tiny blood vessels.
- .....
- 3. The diaphragm moves downward during inhalation.
- (Minia 2023)
- .....
- 4. The diaphragm moves upward during exhalation.
- (Cairo 2023)
- .....

**8 Cross out the odd word :**

- 1. Saliva – Stomach – Esophagus – Small intestine. (.....)
- 2. Mouth – Lungs – Stomach – Large intestine. (.....)
- 3. Nose – Throat – Trachea – Anus. (Alex. 2023) (.....)

- 9** Using the following table, mention the name of the tube-shaped organs of the digestive and respiratory systems inside our bodies :

(A)	(B)
Organ (1) .....	through which food passes to the stomach.
Organ (2) .....	in which the absorption of nutrients takes place.
Organ (3) .....	it ends with anus.
Organ (4) .....	it connects the throat with the two lungs.

- 10** Compare between :

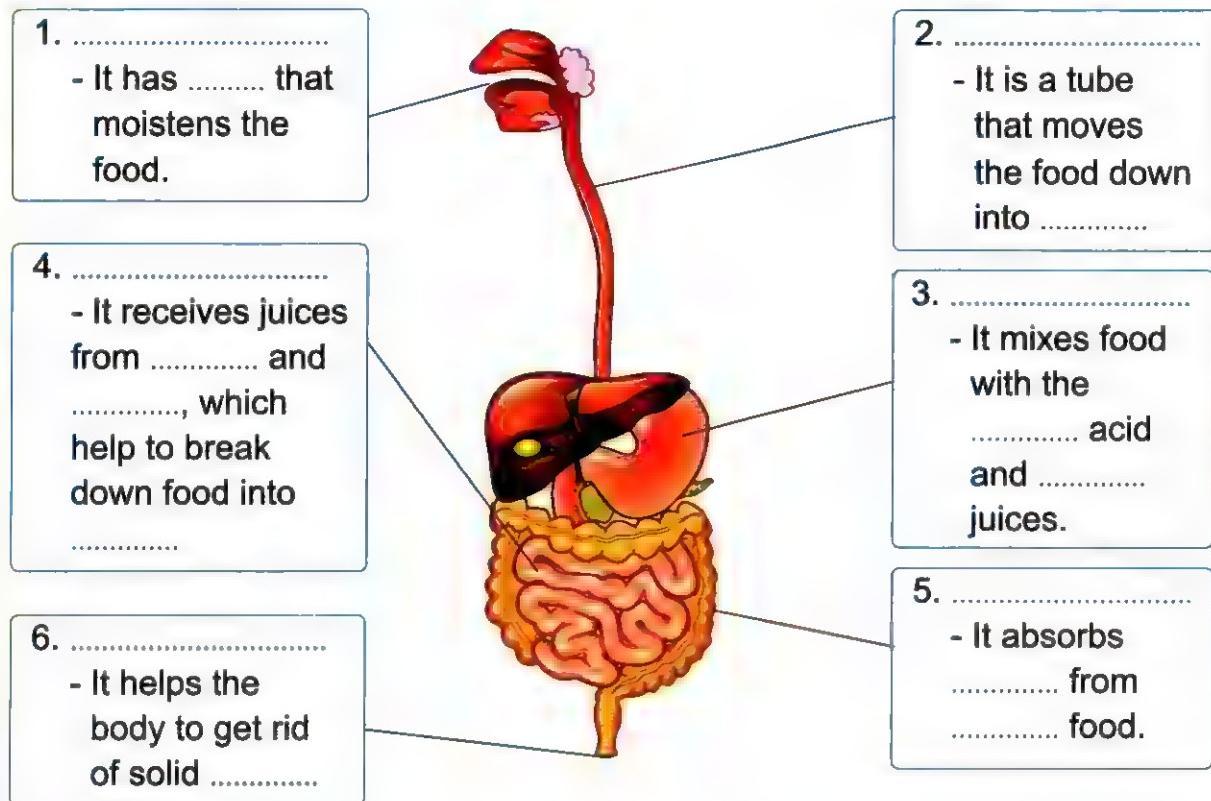
(Cairo 2022)

Points of comparison	Inhalation	Exhalation
<b>1. Diaphragm movement :</b>	.....	.....
<b>2. Size of chest cavity :</b>	.....	.....
<b>3. The air is rich in :</b>	..... gas.	..... gas.

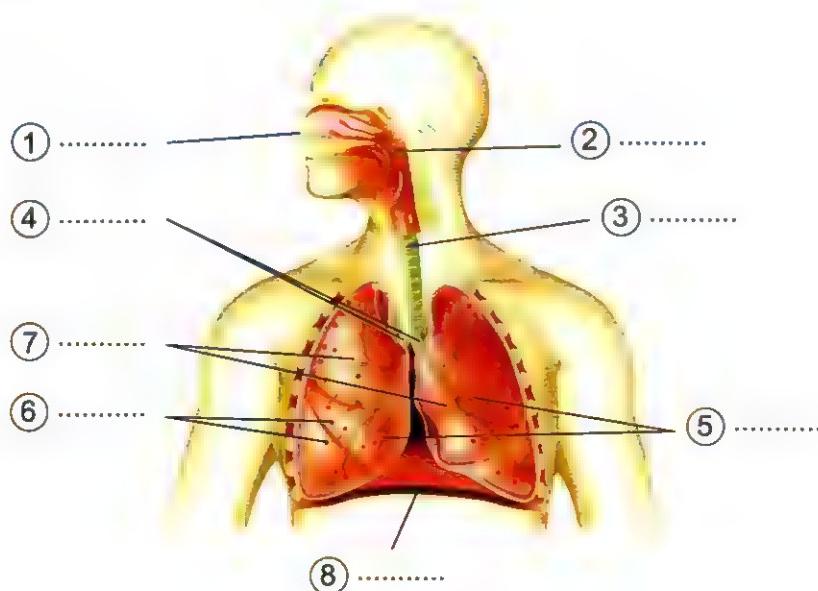
- 11** Put (✓) in front of the name of the system to which each of the following organs belongs :

The organ	The system	
	Digestive	Respiratory
1. Trachea	.....	.....
2. Anus	.....	.....
3. Stomach	.....	.....
4. Lungs	.....	.....
5. Small intestine	.....	.....
6. Esophagus	.....	.....
7. Diaphragm	.....	.....
8. Nose	.....	.....
9. Large intestine	.....	.....
10. Liver	.....	.....
11. Pancreas	.....	.....
12. Throat	.....	.....

- 12** Look at the following figure which represents the human digestive system, then mention the name of each organ and complete the sentences below :



- 13** Look at the following figure which represents the human respiratory system, then label it :



# LESSON FOUR

## Activity 10 How Fish Breathe

► Look at the following pictures, then put (✓) or (✗) :



1 Human can stay and breathe under water all the time. ( )

2 Fish can stay and breathe under water all the time. ( )

### Structural adaptation of fish :

- Unlike human, fish don't breathe using lungs, but they have **gills** to breathe.
- Gills are considered as unique structural adaptation that allow fish to live and breathe under water.
- Gills are found on both sides of a fish's head.

### How do fish breathe under water ?

Water enters the mouth of the fish and passes across the gills.



Blood vessels inside the gills carry oxygen gas to the rest of the body and release carbon dioxide gas.

#### Note

Fish need clean water to survive, as we need to breathe clean air to stay healthy.



## Check your understanding

► Compare between the human respiratory system and the fish respiratory system using these words :

(carbon dioxide - blood - oxygen - air - lungs - water - gills)

Points of comparison	The human respiratory system	The fish respiratory system
<b>Similarities :</b>	<ul style="list-style-type: none"> <li>- Inhale ..... gas.</li> <li>- Exhale ..... gas.</li> <li>- ..... carries oxygen gas to all the body parts.</li> </ul>	
<b>Differences :</b>	<ul style="list-style-type: none"> <li>- Humans have ..... to inhale oxygen gas from .....</li> </ul>	<ul style="list-style-type: none"> <li>- Fish have ..... to inhale oxygen gas from .....</li> </ul>

► Put (✓) or (✗) :

1. The importance of gills to fish is like that of lungs to human. ( )
2. Oxygen gas reaches all parts of the fish's body through the blood vessels present in its gills. ( )
3. Carbon dioxide gas is harmful for both fish and human. ( )
4. The type of adaptation in fish's gills is considered as behavioral adaptation. ( )

## Activity 11 Humans Change the Environment

- Human activities cause changes or impacts in the ecosystem over time, so organisms will have to adapt these changes to survive.

**Human activities** that cause changes in the environment :



① Cutting down forests.



② Farming and clearing lands.



③ Building communities instead of grasslands.



④ Introducing plants and animals into the environment that were never part of the ecosystem.



⑤ Air pollution that is caused due to the exhausts from cars and some factories.



⑥ Water pollution that is caused due to bad habits, such as throwing waste materials to waterways and soil.

### Note

Changes resulted from human activities can cause the disappearance (extinction) of plants and animals that once lived in an environment.



**Give reason for ...**

**Although the air, water and soil get polluted as a result of human activities, plants and animals can survive.**

Because :

- Some animals can survive by moving to another ecosystem to find what they need.
- Plants depend on their seeds to land in a better place for them to survive and grow.

disappearance  
extinction  
human activities

أختفاء  
انقراض  
أنشطة الإنسان

farming  
communities  
exhausts

زراعة  
المجتمعات  
عوادم

waterways  
clearing land  
introduce

نهر  
ال terso  
يدخل

pollution  
bad habits

تلوث  
عادات سيئة

- As the human activities have negative effects on animals and plants, they also have negative effects on human such as :



① Damage of lungs.

② Asthma (breathing difficulty).

③ Heart diseases.

### Notes

- Water pollution makes the human hard to find clean drinking water.
- Air, water and soil pollution make the crops cannot grow.
- Air pollution (smog) makes the human hard to breathe.
- People live in cities that have high air pollution level must change their lifestyle to decrease air pollution.

### The role of human to help restore ecosystem :

- As humans can cause harmful changes, they can help restore their ecosystems by :

- Replanting the cleared forests.
- Removing the pollutants of air and water.
- Preserving plants and animals in these ecosystems.



### Check your understanding

#### ► Put (✓) or (✗) :

- Water pollution affects fish, but doesn't affect humans and plants. ( )
- Humans must keep air, water and soil clean. ( )

In the Assessment Book :

Try to answer :

Self-Assessment ④

negative effects  
asthma

أثار سلبية  
مرض الروماتيزم

lifestyle

نمط الحياة

بريل

damage of lungs

تلف الرئتين  
ضباب دخاني

restore

يساعد

# Exercises on Lesson 4

● Understand

● Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

1. Both of human and fish .....
  - a. can breathe in air.
  - b. can breathe in water.
  - c. use oxygen gas to breathe in.
  - d. use carbon dioxide gas to breathe in.
2. Fish use ..... to breathe in water. (Sohag 2022 / Sharkia 2023)
  - a. tail
  - b. eyes
  - c. lungs
  - d. gills
3. Gills differ from lungs, in that gills .....
  - a. take in oxygen gas.
  - b. expel out carbon dioxide gas.
  - c. extract oxygen gas from water.
  - d. extract oxygen gas from air.
4. Gills in fish are considered as .....
  - a. behavioral adaptation.
  - b. structural adaptation.
  - c. camouflage adaptation.
  - d. behavioral and structural adaptations.
5. All of the following human activities can negatively affect the nature, except .....
  - a. cutting down forests.
  - b. removing air pollutants.
  - c. farming and clearing lands.
  - d. throwing wastes in waterways.
6. Human activities and bad habits can pollute ..... of an ecosystem.
  - a. air and soil only
  - b. soil and waterways only
  - c. air and waterways only
  - d. air, soil and waterways
7. Pollution of an ecosystem can affect .....
  - a. plants and animals only.
  - b. animals and humans only.
  - c. humans and plants only.
  - d. plants, animals and humans.
8. If the environment is slowly changed, plants ..... to survive and grow.
  - a. must have a taproot
  - b. must have buttress roots
  - c. must decrease their adaptation
  - d. must land their seeds in another better place
9. From the negative effects of human activities on the human health are .....
  - a. lung damage and asthma.
  - b. asthma and wounds.
  - c. heart problems and wounds.
  - d. lung damage and wounds. (Qalyoubia 2022)

- 10. Human can help restoring ecosystem by all of the following activities, except .....
- replanting the cleared forests.
  - removing air and water pollutants.
  - producing more factories exhausts.
  - preserving existed plants and animals.

**2 Choose from column (B) what suits it in column (A) :**

(A)	(B)
1. Changes that done by human and may harm existed birds in an ecosystem are 2. Changes that done by human and cause air pollution are 3. Changes that done by human and can restore air in an ecosystem are	a. building more factories that produce more smog inside cities. b. rainfall, floods and severe weather events. c. replanting the cleared forests and removing of air pollutants. d. clearing lands and cutting down forests.

1. ....

2. ....

3. ....

**3 Put (✓) or (✗) :**

- 1. Human breathes using gills, while fish breathes using lungs. ( )
- 2. Gills are found on one side of a fish's head. ( )
- 3. Both of lungs and gills take carbon dioxide gas inside the body and release oxygen gas outside the body. ( )
- 4. Gills are unique structural adaptation that allow fish to live and breathe under water. ( )
- 5. As human needs clean water to drink, fish needs clean air to breathe. ( )
- 6. Cutting down rainforests may cause disappearance of starred agama. ( )
- 7. Throwing waste materials in waterways is one of the bad habits that must be stopped. ( )
- 8. The way of survival of animals differ from that of plants, if the ecosystem is rapidly changed. ( )
- 9. Pollution is one of the most dangerous problems that affect all living organisms. ( )
- 10. Respiratory problems like lung damage and asthma occur when water pollution is high over a long period of time. ( )

- 11. Humans can restore ecosystem as well as they can harm it. ( )
- 12. When the pollution level in a city is very high, people are forced to change their lifestyle. ( )

**4 Correct the underlined words :**

1. Fish use gills to take carbon dioxide gas out of the water. (*Menofia 2022*) (.....)
2. Air enters the mouth of a fish and then passes across the gills. (.....)
3. Blood vessels of lungs and gills are similar in carrying carbon dioxide gas to all the body parts. (.....)
4. Gills are unique behavioral adaptation that allow fish to breathe under water. (.....)
5. When an ecosystem is severely polluted, animals only are affected. (.....)
6. Water pollution is caused due to the smog of factories and cars. (.....)

**5 Write the scientific term of each of the following :**

- 1. Structures that allow fish to breathe under water. (.....)
- 2. A gas presents in air and water, and is very important for breathing process. (*Bahira 2022*) (.....)
- 3. A gas which the human and fish bodies must get rid of during exhalation process. (.....)
- 4. A kind of pollution that is caused due to throwing waste materials into the waterways and soil. (.....)
- 5. A kind of pollution that is caused due to the exhausts from cars and some factories. (.....)

**6 Complete the following sentences :**

1. Humans use ..... to breathe, while fish use ..... to breathe. (*Cairo 2023*)
2. In both human and fish, ..... carries oxygen gas to all the body parts.
3. Gills of fish are considered as ..... adaptation that allow fish to breathe under water.
4. Human activities and bad habits can pollute ..... , ..... and soil of an ecosystem.
5. All living organisms including humans, animals and ..... are affected negatively by pollution.
6. One of air pollutants that makes human hard to breathe is .....

7. When air pollution is very high over a long period of time, it may cause ..... , ..... and heart diseases to humans.

### 7 Give reasons for :

- 1. Gills are unique structural adaptation in fish. (Cairo 2023)

.....  
.....

- 2. Cars and factories exhausts cause breathing problems.

.....  
.....

- 3. Sometimes people in big cities are forced to change their lifestyle.

.....  
.....

### 8 What happens if ... ?

- 1. Human activities and bad habits increases.

.....  
.....

- 2. The exhausts from cars and factories increase in big cities.

.....  
.....

- 3. Water pollution increases. (for human and fish).

.....  
.....

### 9 Look at the opposite figures, then answer the questions :

- 1. The death of fish in figure (1) may happen due to .....

- |                     |                     |
|---------------------|---------------------|
| a. wildfires.       | b. soil pollution.  |
| c. water pollution. | d. cutting forests. |



Figure (1)

- 2. In your opinion, the smog produced from the factories in figure (2) may cause ..... in the ecosystem.

- |  |
|--|
| a. increasing of air pollution                 |
| b. decreasing of air pollution                 |
| c. keeping the lungs of human healthy          |
| d. increasing the number of plants and animals |



Figure (2)

# LESSON FIVE

## Activity 12 Record Evidence Like A Scientist

- ▶ In this concept, you have learned a lot about how different types of adaptations help plants and animals survive.
- ▶ In this activity, which will be repeated at the end of each concept, we will learn how to think like scientists to answer a question about one of the main points of this concept through four main steps :
  - Step 1 : The Question.
  - Step 2 : My Claim.
  - Step 3 : My Evidence.
  - Step 4 : My Scientific Explanation.



### Step 1 The Question

How do different types of animals and plants adapt to survive in extreme climate ?



### Step 2 My Claim

Animals and plants have the ability to change their bodies structures and behaviors to adapt the extreme climate to survive in their environments.



**Note**  
Your claim should be formed of a sentence that gives an answer for the previous question in step 1.



### Step 3 My Evidence

- Examples of structural adaptations :
  - Some animals have thick fur to keep their bodies warm, while some other animals have extra-long ears to keep their bodies cool.
  - Some plants have tiny leaves to hold in water.
- Examples of behavioral adaptations :
  - Some animals stay in burrows to keep their bodies warm or cool.



**Note**  
You should mention enough and suitable evidence that support your claim.



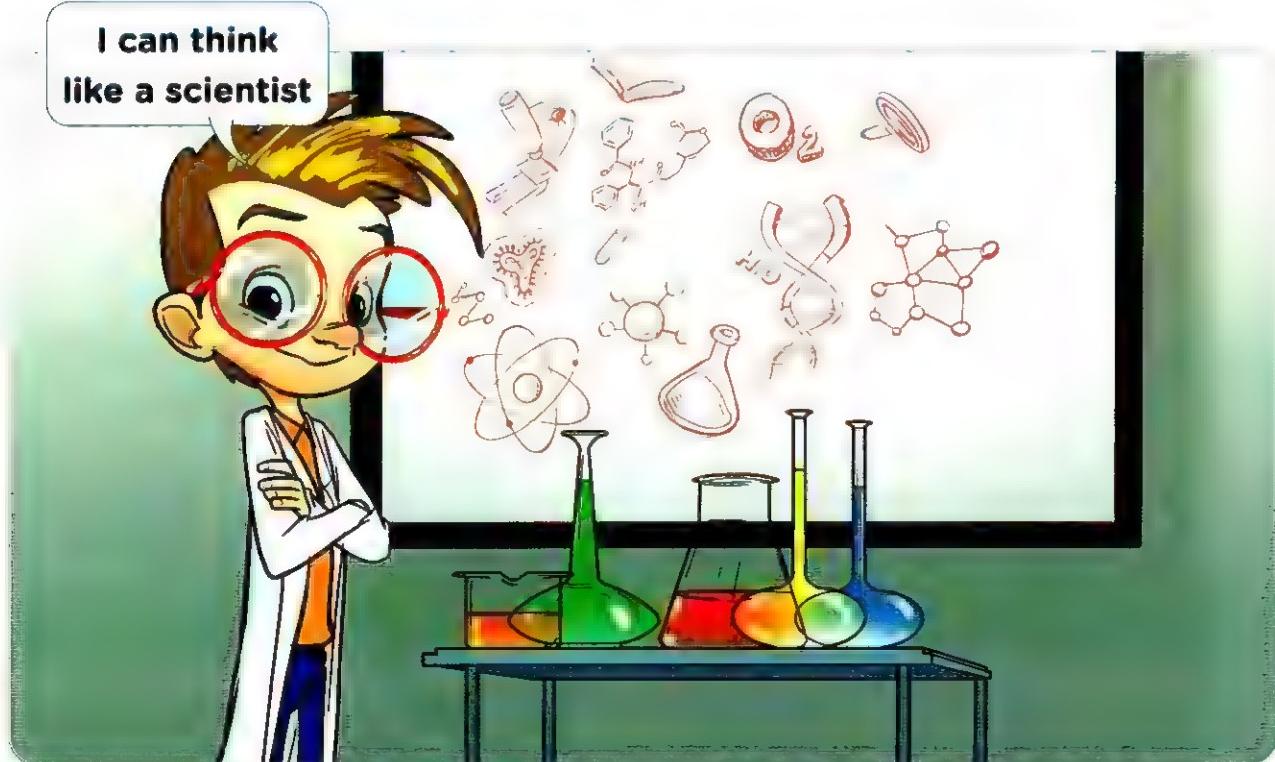
## Step 4 My Scientific Explanation

Animals and plants can survive in extreme climate through structural and behavioral adaptations, where :

- The structural adaptation in the polar bears that have thick fur and penguins that have a layer of fat to adapt the cold climate in polar regions.
- The structural adaptation in fennec foxes that have extra-long ears and also the behavioral adaptation as they stay in burrows to adapt the hot climate in desert regions.
- The structural adaptation in acacia trees that have tiny leaves to hold in water to adapt hot climate in savannah regions.

### Note

Your scientific explanation should explain your claim and evidence introducing some supportive examples from what you have learned.



## Activity 13 STEM in Action

**Careers and adaptation :**

- Through researches, scientists can learn how different organisms adapt to their environments and help **endangered species** survive.
- In this lesson, we are going to study **amphibians** which are one of the most amazing living organisms on Earth.

**Amphibians :**

- They are small animals that live on **land** and in **water** such as :

Frogs



Toads



Salamanders



- They can live in moist (wet) environments like **rainforests**, **water streams** and **ponds**.
- Like humans, adult amphibians can breathe using **lungs** when they are on **land**, but amphibians can also take in oxygen from water.

**Structural adaptation of amphibians to live in wet environments :**

- Amphibians breathe in (respire) through their **lungs** and **skin** to adapt to live on land and in water as follows :



Golden frog

**Breathe in through lungs**

- On land, amphibians inhale oxygen gas from air through their lungs.

**Breathe in through skin**

- The bodies of amphibians are covered with skin that allows water and gases to pass through, so they can absorb (extract) oxygen directly from water.

- **Amphibians need clean water and air to stay healthy, because they are very sensitive to the effects of :**
  - Water pollution.
  - Air pollution.
  - Viruses that can travel through water.

### **The role of scientists to protect many types of amphibians from extinction :**

- **Scientists (biologists) are working to save many types of amphibians from extinction by studying :**
  - How amphibians breathe in air and water.
  - Factors cause air and water pollutions that affect the life of amphibians.
  - What make these animals sick in their environments.

### **How do people help in protection of amphibians from extinction ?**

- **Clean air and water are important for amphibians, so people should :**
  - Avoid throwing waste materials in water.
  - Dispose of chemicals in a correct way helps to avoid water pollution.

#### **Note**

Ninety species of amphibians have become extinct in the last 20 years in addition to 124 other endangered species.



### **Check your understanding**

#### ► Put (✓) or (✗) :

1. Throwing chemicals into the water doesn't affect the life of amphibians. ( )
2. Amphibians breathe in through their lungs and skin. ( )

### **Review on Concept (1.1)**

To review this concept look at the **Assessment Book**  
**"Part 2 : Final Revision".**

#### **In the Assessment Book :**

##### **Try to answer :**

- Self-Assessment (5)
- Model Exam on Concept (1.1)

sensitive  
biologists  
protection

حساس  
علماء الأحياء  
حماية

golden frog  
viruses  
sick

الضفدع الذهبي  
فيروسات  
يمرض

dispose of  
extinct  
furniture

يخلص من  
يقرض  
أثاث المنزل

بالإضافة إلى  
يشغل

# Exercises on Lesson 5

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. Amphibians are adapted to live in ..... that suits their adaptation.
  - a. dry environment
  - b. moist environment
  - c. arctic environment
  - d. sandy environment
- 2. Starred agama and salamander, .....
  - a. both are reptiles.
  - b. both are amphibians.
  - c. the first is a reptile, while the second is an amphibian.
  - d. the first is amphibian, while the second is reptile.
- 3. If amphibians have gills and they don't have lungs and also cannot respire through skin, then .....
  - a. they cannot live outside water.
  - b. they can live outside water.
  - c. they cannot live under water.
  - d. they can live in desert landscapes.
- 4. Amphibians can take in oxygen gas from .....
  - a. water only.
  - b. air only.
  - c. food and air.
  - d. water and air.
- 5. In rainforests, we can find .....
  - a. panther chameleon and arctic foxes.
  - b. amphibians and fennec foxes.
  - c. arctic foxes and fennec foxes.
  - d. panther chameleon and amphibians.
- 6. If the number of an animal species becomes zero due to severe changes in its natural habitat, this means that this species .....
  - a. becomes endangered.
  - b. becomes extinct.
  - c. will survive.
  - d. going to be extinct.
- 7. Both humans and amphibians breathe in oxygen. Which of the following sentences is correct ? .....
  - a. Both can breathe in oxygen gas through lungs.
  - b. Both can take in oxygen gas through skin.
  - c. Humans can breathe in oxygen gas from water and air.
  - d. Amphibians can breathe in oxygen gas through gills.

- 8. Blood vessels that carry oxygen gas in amphibians, present in .....
  - a. skin and digestive system.
  - b. lungs and eyes.
  - c. digestive system and eyes.
  - d. skin and lungs.
  
- 9. Amphibians, lizards, trees, birds, fish and humans .....
  - a. some of them need oxygen gas to respire.
  - b. some of them need carbon dioxide gas to respire.
  - c. all of them need oxygen gas to respire.
  - d. all of them need carbon dioxide gas to respire.
  
- 10. If a pond where some frogs live is highly polluted with wastes and viruses.  
What you have to do to preserve these frogs ? .....
  - a. Fill in the pond with sand.
  - b. Dry this pond from water.
  - c. Supply this pond with more oxygen gas.
  - d. Transfer these frogs to a clean water habitat.

**2 Put (✓) or (✗) :**

- 1. Amphibians include frogs and salamanders. (Alex. 2023) ( )
- 2. The natural habitat of amphibians is rainforest, while that of panther chameleon is desert. ( )
- 3. The number of amphibians increases in the last few years, due to restoring of its ecosystem. ( )
- 4. Arctic foxes and amphibians cannot be found in the same habitat. ( )
- 5. Salamanders and fish can breathe in air through lungs. ( )
- 6. In the habitat of amphibians, we can find some types of reptiles. ( )
- 7. Scientists try to save golden frogs from extinction. ( )
- 8. Clean water and air are very important for respiration process in amphibians. ( )
- 9. It is important to advice people not to throw waste materials in waterways to save amphibians' life. ( )

**3 Write the scientific term of each of the following :**

- 1. Species that include frogs, toads and salamanders. (.....)
- 2. The organ through which salamanders can take in oxygen gas directly from water. (.....)
- 3. A gas is present in water and air that living organisms breathe in during respiration. (Cairo 2022) (.....)
- 4. The type of adaptation that allows frog to take in oxygen gas from water directly through the skin. (.....)
- 5. A respiratory organ that contains little sacs, and found in humans, frogs and cows but not in fish. (.....)

**4 Complete the following sentences :**

- 1. Starred agama lizard is a ..... , while frog is an .....
- 2. Humans, amphibians and reptiles have ..... to breathe in oxygen gas from air.
- 3. Bull shark can respire through ..... only, while salamander can respire through ..... and .....
- 4. Both humans and adult amphibians have no ..... that is present in fish for respiration.
- 5. As the pollution rate of water in ponds and air increases, the number of amphibians .....
- 6. Amphibians have two ways to breathe in oxygen, one from air through ..... and the other from water through .....
- 7. The ability of amphibians to take in oxygen gas from water through the skin, is considered as ..... adaptation. (Giza 2022)
- 8. All living organisms breathe in oxygen gas and gives out ..... as a waste product.
- 9. Pollution of ..... and ..... may cause a big problem on the amphibians survival.

**5 Correct the underlined words :**

- 1. Fish can breathe only in air. (.....)
- 2. Amphibians live in dry environments. (.....)
- 3. Starred agama is a reptile, while frog is a lizard. (.....)
- 4. Amphibians have gills as well as humans for respiration. (.....)

5. Amphibians can take in carbon dioxide gas from air for respiration. (.....)
6. In rainforests, we can find panther chameleon and arctic fox. (.....)
7. Reptiles have two different ways for breathing. (.....)
8. Humans and frogs can breathe in oxygen gas in water. (.....)

### 6 Give reasons for :

1. Skin of fish is different from that of frog, although both of them live in water.

.....  
.....

2. Dry seasons is very harmful for amphibians.

.....  
.....

3. Pollution of air and water can affect the survival of amphibians.

.....  
.....

4. Scientists must study how amphibians interact with their environments.

.....  
.....

### 7 What happens if ... ?

1. Pollution level increases in the natural habitat of amphibians.

.....  
.....

2. The ecosystem of amphibians is containing clean air and water.

.....  
.....

3. Amphibians don't have lungs and breathe only through skin.

.....  
.....

4. The number of predators of amphibians increases.

.....  
.....

5. Salamanders have lungs only to respire.

.....  
.....

6. Skin of frogs becomes dry.

.....  
.....

# Model Exam 1

1

## on Concept (1.1)

Total mark

15

### (A) Choose the correct answer :

(5 marks)

1. Both golden frog and polar bear, .....  
a. live in the same habitat.      b. can breathe in oxygen gas in water.  
c. have the same body coat.      d. are living organisms.
2. The color of the body coat of arctic fox changes according to the season, this is considered as .....  
a. change of the way of breathing.      b. a type of structural adaptation.  
c. change of the way of drinking.      d. a type of behavioral adaptation.
3. In dry desert, most plants need ..... to get water from the sandy soil.  
a. long trunk      b. long roots  
c. long branches      d. long leaves
4. The food moves into the stomach through the .....  
a. esophagus.      b. trachea.  
c. small intestine.      d. tongue.

(Alex. 2023)

### (B) Give a reason for the following :

Gills are unique structural adaptation in fish.

.....

.....

### 2 (A) Put (✓) or (✗) :

(5 marks)

1. Both salamander and fish can breathe in through lungs. ( )
2. In polar environment, the sandy-colored fur of caracal helps it blend in with snow. ( )
3. Panther chameleon and agama lizard can use one of their eyes for searching for food and the other one to look out for danger. ( )
4. Adaptation to store water is an important character for plants that live in dry desert environment. ( )

### (B) What happens if ... ?

The diaphragm moves upward during exhalation.

(Minia 2023)

.....

.....

**3 (A) Correct the underlined words :**

(5 marks)

1. Amphibians live in dry environments. (.....)
2. Reptiles like toads have two different ways for breathing. (.....)
3. Fish use gills to take in carbon dioxide gas out of the water. (.....)
4. Mangrove tree has wide leaves to absorb a large amount of sunlight. (.....)

**(B) Give only one example of behavioral adaptation in bull shark.**

.....

# Model Exam 2

## on Concept (1.1)

Total mark

15

### 1 (A) Write the scientific term of each of the following :

(5 marks)

- It covers the body of some types of bears to keep their bodies warm and to blend in with snow. (.....)
- A feature in bull shark, in which the lower surface of its body is lighter than its upper surface. (.....)
- A plant lives in salt water environment and it has long roots to resist water waves. (.....)
- An organ through which solid wastes of digestion leave the body. (.....)

### (B) Cross out the odd word :

- Penguin – Acacia tree – Pine tree – Polar bear. (.....)
- Panther chameleon – Fennec fox – Bull shark – Agama lizard. (.....)

### 2 (A) Choose the correct answer :

(5 marks)

- The stomach has an acid that helps in .....  
a. crushing of food.  
b. digestion of food.  
c. absorption of digested food quickly.  
d. absorption of water from undigested food.
- Water lily has wide floating leaves to .....  
a. prevent the loss of water.      b. resist the water waves.  
c. absorb a large amount of sunlight.  
d. absorb a large amount of water.
- All of the following living organisms live in desert, except .....  
a. palm tree.                        b. pine tree.  
c. starred agama lizard.           d. fennec fox.
- Amphibians absorb oxygen directly from water by their .....  
a. skin.                              b. gills.                           c. lungs.                           d. nose.

### (B) Correct the underlined words :

- Gills are unique behavioral adaptation that allow fish to breathe under water. (.....)

2. Small intestine is a long muscular tube that moves food down into the stomach. (.....)

**3 (A) Look at the opposite figures, then answer the questions below :**

- (1) Which figure represents inhalation ? (.....)
- (2) Which figure represents exhalation ? (.....)
- (3) In figure (a), ..... muscle contracts and the size of chest .....
- (4) In figure (b), the air that comes out is rich in ..... gas .

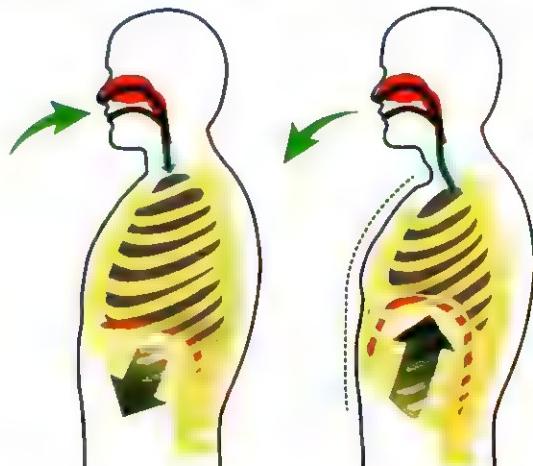


Figure (a)

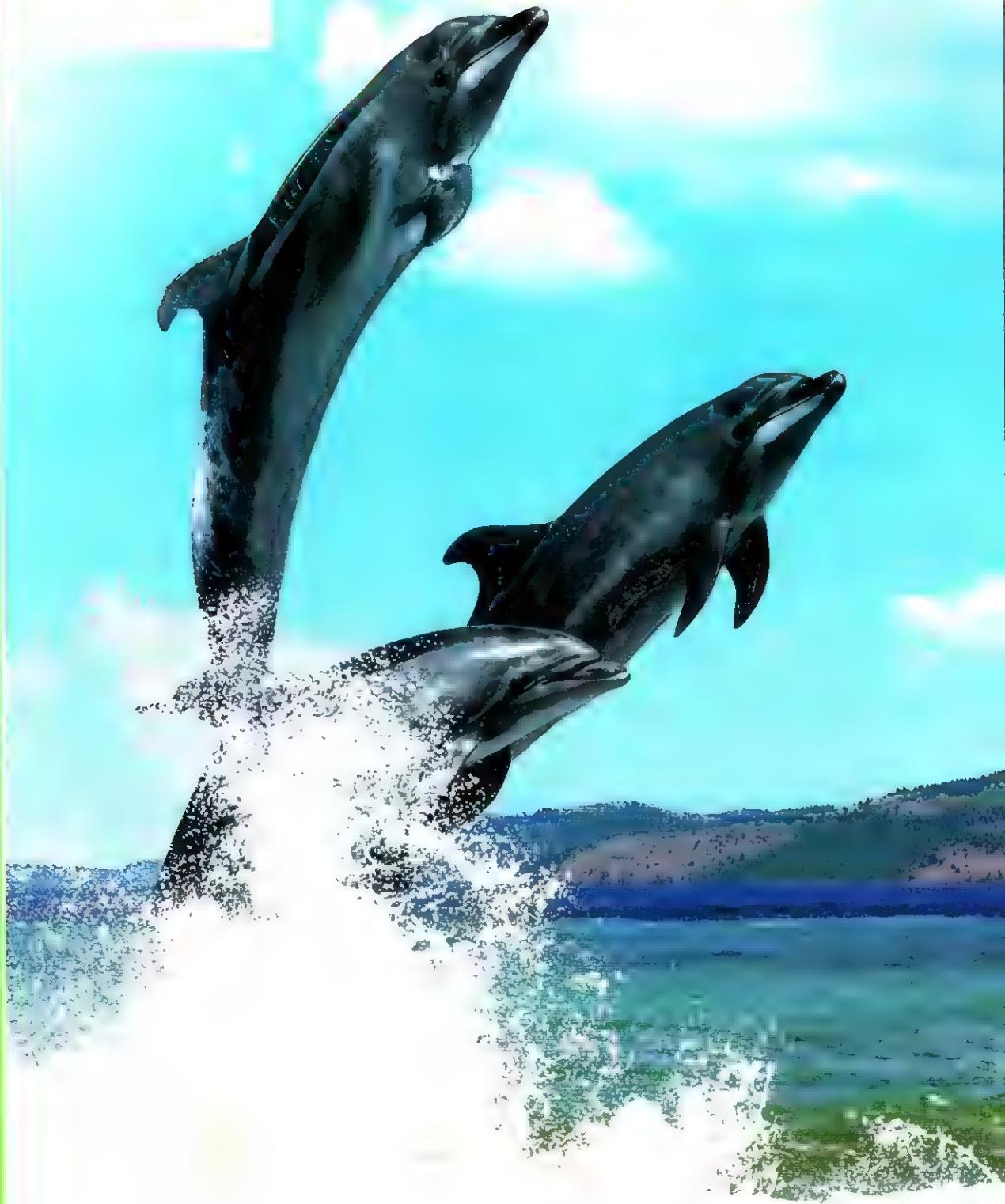
Figure (b)

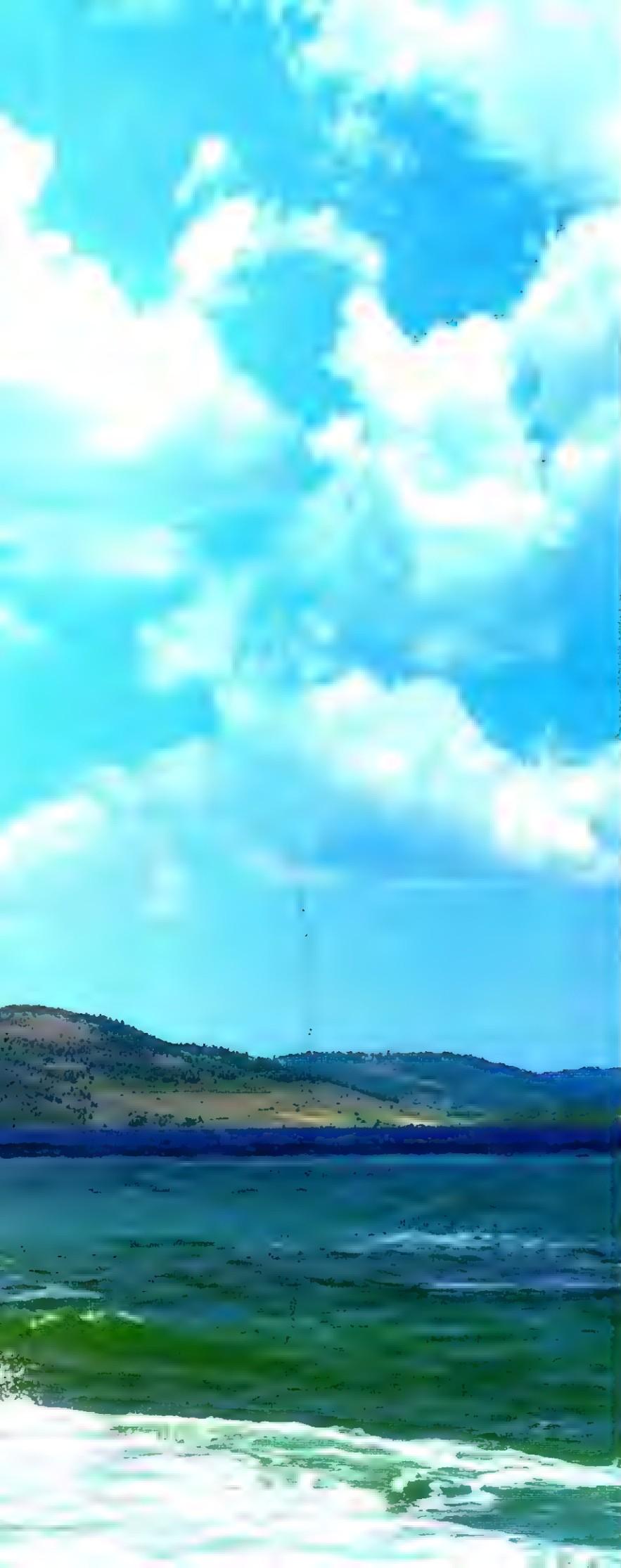
**(B) Give a reason for the following :**

The human body is made up of different systems.

.....

# 1.2 Senses at Work





## Learning outcomes

**By the end of this concept, your child will be able to :**

- Develop models illustrating how animals receive, process and react to information in their environments.
- Explain how organs and systems work together to process and respond to input from the senses.
- Plan and carry out investigations to produce evidence that the senses play a role in reaction time.
- Argue, using evidence, that light and sound allow for the transfer of information through systems of communication.
- Compare innovative human designs to systems of communication in the natural world.

## Key vocabulary

- |                         |                |
|-------------------------|----------------|
| • Brain                 | • Receptor     |
| • Reflex                | • Senses       |
| • Sound                 | • Information  |
| • Nerve                 | • Echolocation |
| • Echo                  |                |
| • Communication systems |                |

## Notes For Parents On Concept [1.2]

Lessons	Activities	What you should do with your child
1	Activity 1	Explain to your child how humans and animals gather information from the environment by using their senses.
	Activity 2	Discuss with your child how dolphins use the sense of "echolocation" to locate their preys and other objects under water.
	Activity 3	Discuss with your child that animals can use more than one sense for one purpose.
2	Activity 4	Discuss with your child how some nocturnal animals use their super senses to hunt their preys in the dark during the nighttime.
	Activity 5	Explain to your child the structure of the nervous system and how it works.
	Activity 6	<ul style="list-style-type: none"> <li>- Discuss with your child the difference between humans and animals in avoiding danger.</li> <li>- Explain to your child how the nervous system of "jerboa" helps it to avoid danger.</li> </ul>
3	Activity 7	Discuss with your child the different functions of the nervous system.
	Activity 8	Let your child answer some questions about the nervous system and its functions to check his/her understanding.
4	Activity 9	<ul style="list-style-type: none"> <li>- Explain to your child how ants communicate with each other.</li> <li>- Discuss with your child the way of communication that humpback whale use.</li> </ul>
	Activity 10	Let your child know the similarities and differences between the special cane of the blind person and the bat echolocation property.

# LESSON ONE

## Activity 1 Can You Explain ?



**Can you notice how the above living organisms receive information from their surrounding environments and how they are responding to them ?**

- Humans have ears which are the organs of hearing to listen to music.
- Owls have extraordinary senses of hearing and sight to be able to find their preys in the dark.
- Dogs have very sharp senses of hearing and smell, which are used in guarding.
- The Egyptian mongoose makes sounds to communicate with other mongooses to move from one place to another or when searching for food.

► **From the previous explanation we conclude that :**

Animals have senses like humans that enable them to communicate with each other and adapt to their surrounding environments.

► **In this concept, we will study :**

- Dolphin senses.
- Super senses of some animals.
- The nervous system and how it works.
- Songs of whales.
- How the five senses work.
- Communication systems.

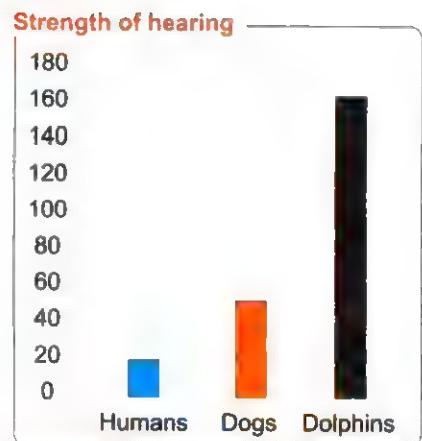
## Activity 2 Dolphin Senses

► Look at the opposite graph, then put (✓) or (✗) :

Living organisms in the graph have similar hearing senses. ( )

- Dolphins have sharp senses that help them survive through :

- Finding food.
- Protecting themselves under water.
- The most sharp sense that dolphins have is the **sense of hearing**, since they can hear all kinds of sound.



### How can dolphins locate organisms and other things under water ?

Dolphins use a property known as "echolocation" that depends on "echo" to determine the location of other living organisms and objects in the water.

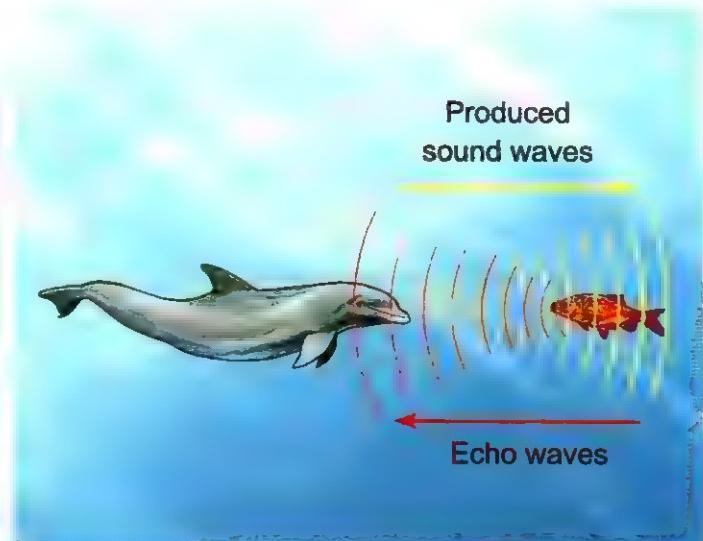
**Echo** is the bouncing back of sound waves when they hit a solid surface.

► Let's see how dolphin use the sense of echolocation :

Dolphin produces **sound waves** that travel through water.

These waves hit objects then bounce back to the dolphin in the form of **echo**.

Echo helps the dolphin to locate its prey and other objects.



### Check your understanding

► Put (✓) or (✗) :

1. Smell is one of the most sharp senses of dolphins. ( )

2. Echo helps dolphins locate their preys. ( )

sharp senses  
survive  
locate

الحواس الفائقة  
يعايش  
يحدد مكان

echolocation  
echo  
waves

تحديد الموضع بالصدى  
صدى  
موجات

hit  
bounce

يصطدم  
برزق (يرجع)

**Activity 3****What Do You Already Know About Senses at Work ?****► Animal perceptions :**

- You have known that animals have senses like those of humans.
- Each animal can use more than one sense for more than one purpose to adapt to its habitat, as shown in the following examples :

Animal	Senses	The purpose
Fox	Hearing and sight	Avoiding danger
Chameleon	Sight and taste	Finding food
Dog	Smell and sight	Recognizing friends
Monkey	Touch, smell, sight, taste and hearing	Identifying objects

**Check your understanding****► Put (✓) or (✗) :**

1. The owl can search for food using its sight sense. ( )
2. The cat can avoid danger using its taste sense. ( )

**In the Assessment Book :****Try to answer :****Self-Assessment ⑥**

# Exercises on Lesson 1

● Understand

● Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. To know if a cup of water is hot or cold, we need to use the sense of .....  
a. sight.      b. hearing.      c. smell.      d. touch.
- 2. We can distinguish between water and milk through .....  
a. taste and hearing.      b. sight and hearing.  
c. smell and hearing.      d. taste and sight.
- 3. The sensory organs of a dolphin help it do all of the following, except .....  
a. surviving.      b. finding food.  
c. finding water.      d. protecting itself under water.
- 4. If there is some salt in a dish and some sugar in another dish, you can distinguish between them through the sense of .....  
a. smell.      b. taste.      c. touch.      d. hearing.
- 5. The five senses of humans and animals are .....  
a. sight, hearing, touch, smell, and movement.  
b. sight, movement, taste, touch, and smell.  
c. taste, touch, movement, hearing, and smell.  
d. sight, hearing, taste, smell, and touch.
- 6. Echo helps bats and dolphins to locate ..... of their preys.  
a. the location      b. the color  
c. the smell      d. the taste
- 7. Dolphins depend on their sharp sense of ..... to get food.  
a. sight      b. taste      c. smell      d. hearing

## 2 Put (✓) or (✗) :

- 1. A human can identify music through ears which are the organs of sight. ( )
- 2. The Egyptian mongoose can communicate with its species by making sounds. ( )
- 3. The sense of hearing of dolphins is stronger than that of human. ( )
- 4. We use our sense of smell to identify the color of a flower. ( )
- 5. Skin helps human distinguish between the taste of different types of food through the sense of touch. ( )
- 6. Chameleon uses its tongue to taste food. ( )
- 7. Foxes have sharp sense of taste to avoid dangers. ( )
- 8. Bats depend on camouflage property to find its food. ( )

**3 Write the scientific term of each of the following :**

- 1. The property that depends on the sense of hearing through which dolphins locate their preys under water. (.....)
- 2. The organ used to recognize different colors. (.....)
- 3. The organ used to recognize different odors. (.....)
- 4. The sense used to differentiate between smooth and rough surfaces. (.....)
- 5. The return back of sound waves on hitting a solid surface. (.....)

**4 Complete the following sentences :**

- 1. The dog uses the senses of ..... and ..... in guarding.
- 2. A human can pay attention to an alarm bell in case of danger through the sense of .....
- 3. Dolphins have sharp sense of ....., which they use to locate living organisms under water through the ..... property.
- 4. We can identify the odor of flowers using the ..... sense.
- 5. Echo is the bouncing off ..... waves when they hit a solid surface.

**5 Correct the underlined words :**

- 1. The dolphin has sharp sense of touch. (.....)
- 2. The dog uses its eyes to recognize odor of humans. (.....)
- 3. The fox uses its tail and ears to run away when it sees or hears its enemies. (.....)
- 4. Dolphins and dogs use echolocation property to hunt. (.....)

**6 Give reasons for :**

- 1. The Egyptian mongoose make sounds.
- .....  
.....

- 2. Owls can hunt during the night.
- .....  
.....

- 3. Dogs are used in guarding.
- .....

- 4. Dolphins can hear all kinds of sound.
- .....

(Give 4 reasons)

**7 What happens to ... ?**

- The sound waves produced by a dolphin when they hit an object under water.
- .....  
.....

**8** Arrange the following steps to illustrate how dolphins use their sharp hearing to catch preys :

- (.....) The sound waves travel and hit the prey, then bounce back to the dolphin in the form of an echo.
- (.....) The echo helps the dolphin locate its prey.
- (.....) The sound produced by a dolphin is transmitted in the form of waves called sound waves.

**9** Look at the following pictures, then choose the correct answer :



Animal (1)



Animal (2)

1. The sharpest senses that animal (1) has are .....  
  - a. touch and smell.
  - b. smell and hearing.
  - c. taste and sight.
  - d. hearing and taste.
2. Animal (1) uses one or both of its sharpest senses in each of the following situations, except .....  
  - a. identifying friends.
  - b. identifying food.
  - c. recognizing strangers.
  - d. tasting food.
3. The sharpest sense that animal (2) has is .....  
  - a. hearing.
  - b. taste.
  - c. touch.
  - d. smell.
4. Animal (2) uses its super sense in each of the following situations, except .....  
  - a. locating objects under water.
  - b. avoiding danger.
  - c. detecting scents of living organisms under water.
  - d. locating preys under water.

# LESSON TWO

## Activity 4 Sensory Organs of Nocturnal Animals

► Look at the following pictures, then put (✓) or (✗) :



① Human can see everything clearly inside a dark room. ( )

② An owl can see its prey in the dark during nighttime. ( )

- You can hear the noise of something moving through the darkness, even you cannot see it clearly.
- Some animals known as "Nocturnal animals" look for their food at night using their sharp senses.

### Nocturnal animals :

They are animals that become active at night to look for their food.

#### ► Why do some animals become active at night ?

1. In extremely hot places, the best time to look for food is nighttime, when it is cooler.
2. Some animals hunt food that is only available at night.
3. Some animals depend on darkness to hide from their preys and surprise them.

#### ► How can nocturnal animals hunt without much available light ?

Super sensory adaptations of nocturnal animals allow them to navigate safely and find food in the dark, as shown in the following examples :

**1. Bats :**

- Bats depend on **echolocation** to find their food.

**Purpose :**

To help bats move around and find its food (preys) at night.

**Notes**

1. Both bats and dolphins use echolocation to find their food.
2. Unlike dolphins, bats are nocturnal animals that can hunt at night.

**2. Owls :**

- Owls have very sharp sight and hearing senses.

**\* Owl's face :**

It has a bowl-shaped face with special type of feathers in its head. **G.R.**

- To direct distant sounds into the owl's ears.

**\* Owls' large eyes :**

Its eyes allow the owl to see tiny and far-away movements of their preys.

**\* Owl's head :**

Its head has the ability to turn in all directions. **G.R.**

- To search for preys everywhere.

**Purpose :**

To detect the movements and sounds of tiny distant preys.

**Check your understanding****► Choose the correct answer :**

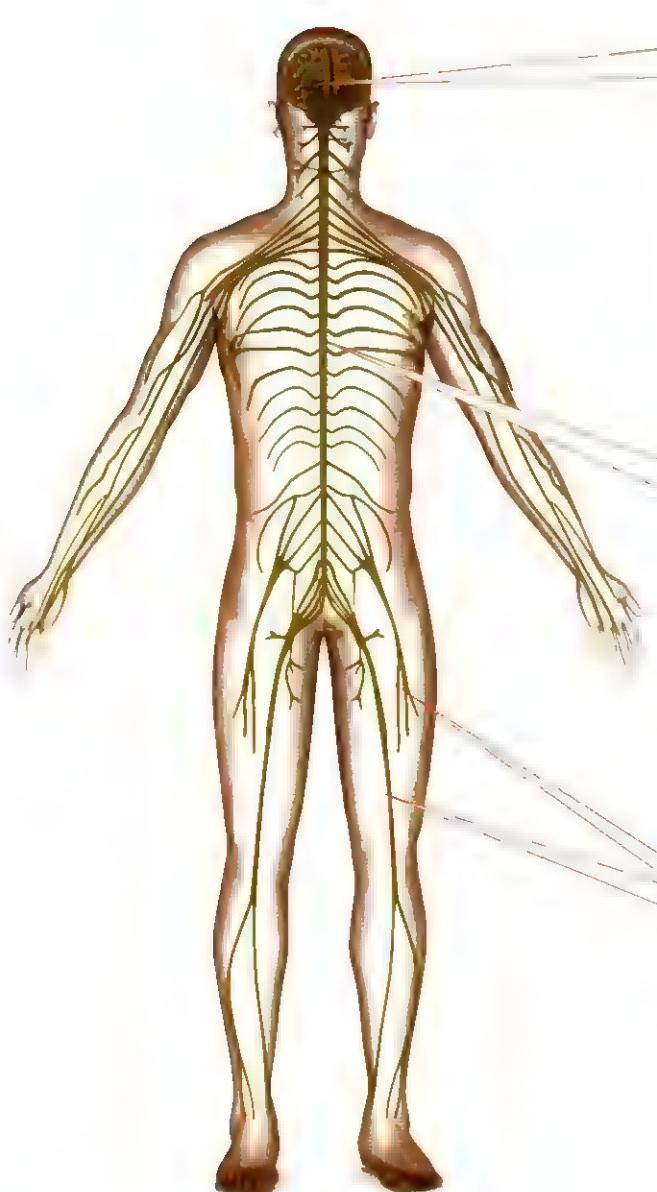
1. The senses of ..... are from the very sharp senses in owls.
  - a. hearing and smell
  - b. sight and smell
  - c. sight and hearing
2. Which of the following animals are not a nocturnal animal ? .....
  - a. Bat.
  - b. Dolphin.
  - c. Owl.

## Activity 5 The Nervous System

- Senses work together with the nervous system to gather information from the environment.
- Mammals such as humans, elephants and dogs have the same structure of nervous system.

### The nervous system consists of :

- The brain.
- The spinal cord.
- Nerves.



Human nervous system

#### The brain

It is connected to the spinal cord.

#### Its function :

It is the main control center in the body.

#### The spinal cord

- It is a big nerve that runs through the backbone.
- It is branched into smaller and smaller nerves.

#### Its function :

It carries messages from the brain to the body parts and vice versa.

#### Nerves

Nerves are distributed throughout the body and connect the sense organs and the body parts with the brain.

#### Their function :

They carry messages from the brain to the spinal cord and other parts of the body and vice versa.

#### Note :

Some nerves are connected directly to the brain such as the nerves of eyes.

### Notes

1. The nerves transmit information from the sensory organs to the brain.
2. The five sensory organs contain a special type of nerves known as sensory receptors.

#### Sensory receptors :

They are nerves found in different parts of the body that are responsible for receiving information from the environment.

#### ► How does the nervous system work if you smell pizza ?

1. The sense organ (nose) receives the information from the environment which is the pizza's odor.
2. Then the sensory receptors of smell that are found in the back of your nose send specific signals along the nerves to your brain.
3. Once the information about the smell reaches your brain, the brain processes that information and determines the type of the food.



#### Check your understanding

#### ► Using the words below to complete the following sentences :

( brain – processes – sensory receptors )



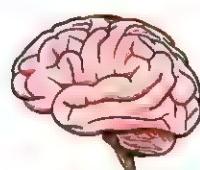
Nose

Receive information



Nerves

Transferring



Brain

Processing

1. The nose contains ..... that receive the odour of the food.
2. The odour transfers to the brain through .....
3. The brain ..... these information and determine the type of the food.

## Activity 6 Sensing the Environment

► In this activity, we will learn how structural adaptations and the nervous system work together to help the jerboa survive.

### **Jumping jerboa :**

- The Egyptian jerboa is a desert rodent.
- It searches for food at night.

### **Jerboa adaptations to the environment :**

Jerboa has large and sensitive ears, so it can detect even a quiet snake.  
(Structural adaption)



- Jerboa's feet and toes have hair to help it grip the sand when it hops and jumps.
- It hops in zigzag patterns, so it can escape quickly from danger.  
(Behavioral adaptation)

Jerboa has long hind legs that enable it to jump a long distance.  
(Structural adaptation)

### **► How do all parts of a jerboa's body work together to avoid danger ?**

**When a snake makes noise as it comes near a jerboa to hunt it :**

The sensory receptors in the jerboa's ears send a message through a network of nerves to its brain.

The jerboa's brain translates this message and alerts its legs to move.

The jerboa's strong hopping legs start to jump away from the danger (the snake) in zigzag paths .

- The jerboa's sharp sense of hearing and its strong legs for jumping work together with its nervous system to help it survive.
- The whole response process of the jerboa running away from danger occurs in less than one second. The time taken by a jerboa to react to danger is known as the "reaction time".

### **Reaction time :**

It is the time taken by the body of a living organism to respond and react to different information from the environment (such as danger).

#### ► How does the jerboa respond to danger compared to a human ?

- Both human and jerboa avoid danger by relying on sensory receptors, nerves and a brain to sense and communicate messages.
- Both human and jerboa move quickly away from danger for their safety.

### **Examples :**



- Jerboa hops in zigzag patterns, so it can escape quickly from danger.



- Human moves quickly his hand away, when it touches the spines of a cactus plant.



### **Check your understanding**

#### ► Put (✓) or (✗) :

- When a jerboa feels unsafe, its brain sends messages to its legs through its nervous system to run away from danger. ( )
- The reaction time is the time taken by a jerboa to respond to danger. ( )
- Jerboa's hind legs are short to help it jump long distances. ( )

**In the Assessment Book :**

Try to answer :

Self-Assessment ⑦

# Exercises on Lesson 2

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

1. The senses you depend on to find a small radio that produces low sound in a dark room are .....  
a. hearing and smell.      b. touch and taste.  
c. smell and taste.      d. hearing and touch.
2. The responsible system for moving your hand away from danger, such as touching a hot cup of tea, is the ..... system.  
a. digestive      b. respiratory      c. nervous      d. urinary
3. When snakes make a noise, the sensory receptors found in jerboa's ..... send a warning message to the brain.  
a. ears      b. nose      c. feet      d. teeth
4. The brain is the main control center in the body, so it can deal with ..... at the same time.  
a. two senses only      b. three senses only  
c. four senses only      d. all the five senses
5. Animals that become active at night are called ..... (Cairo 2023 / Gharbia 2022)  
a. diurnal animals.      b. nocturnal animals.  
c. extinct animals.      d. endangered animals.
6. When your hand touches the spines of a cactus plant, it is withdrawn in .....  
a. less than one second.      b. one minute.  
c. two minutes.      d. one hour.
7. When a jerboa hears the sound of a moving snake, it .....  
a. remains standing in its place.  
b. jumps to hunt the snake.  
c. makes sounds to frighten the snake.  
d. jumps quickly to run away from the snake.
8. The organ that processes the information collected through the sense of sight is .....  
a. the spinal cord.      b. nerves.  
c. the brain.      d. eyes.
9. The nervous system of mammals consists of ..... (Cairo 2022)  
a. the brain only.  
b. the spinal cord only.  
c. nerves and the spinal cord only.  
d. the brain, the spinal cord and nerves.

- 10. Both the spinal cord and nerves .....  
 a. are located in the brain.  
 b. are located in the small intestine.  
 c. transmit messages from the brain to all parts of the body only.  
 d. transmit messages from the brain to all parts of the body and vice versa.
  
- 11. Which of the following choices explains how the body reacts to the smell of food in the correct order ? .....  
 a. Brain → nose → nerves.    b. Nose → brain → nerves.  
 c. Nerves → brain → nose.    d. Nose → nerves → brain.
  
- 12. The correct order for a bat to locate a mosquito using echo, is .....  
 a. mosquito makes a sound → reaches the bat → returns to mosquito.  
 b. bat makes a sound → reaches a wall → returns to mosquito.  
 c. mosquito makes a sound → reaches a wall → returns to mosquito.  
 d. bat makes a sound → reaches the mosquito → returns to bat.
  
- 13. Owls have all the following properties to sense distant preys that make low sounds, except ..... (Menofia 2022)  
 a. large eyes.  
 b. a bowl-shaped face.  
 c. a head that turns in all directions.  
 d. weak sense of hearing.
  
- 14. The owl's large eyes and bowl-shaped face are considered as ..... adaptation.  
 a. only structural  
 b. only behavioural  
 c. both structural and behavioral  
 d. neither structural nor behavioral
  
- 15. Flying bats don't hit different objects at night because they can .....  
 a. see them clearly in darkness.    b. touch them.  
 c. smell them.                         d. hear the echo reflected from them.
  
- 16. Some animals become active during the night due to the following reasons, except that .....  
 a. the night is characterized by the cool weather.  
 b. the night is a good time for relaxation and rest.  
 c. the night is quiet, so that they can hear preys.  
 d. the night is a time when preys are available.
  
- 17. Both bats and mosquitoes are active during night. Which of the following statements is correct ? .....  
 a. Both can swim well.                 b. Both can run fast.  
 c. Bats prey on mosquitoes.            d. Mosquitoes prey on bats.

**2** Choose from column (B) what suits it in column (A) :

• (1)

(A)	(B)
1. Bat	a. It is a flying nocturnal animal that can hear the quiet movements of rats.
2. Owl	b. It is a desert rodent that has large and sensitive ears.
3. Jerboa	c. It is a non-flying mammal. d. It is a flying nocturnal animal that sound reflects to it after hitting insects.

1. .... 2. .... 3. ....

• (2)

(A)	(B)
1. Sensory receptors	a. It is the main control center in the body.
2. Nerves	b. They are electrical impulses that reach the brain.
3. Brain	c. It is found in the backbone and helps transmit messages between the body and the brain.
4. Spinal cord	d. They are found on the sensory organs and the first to sense the surrounding environment. e. They receive information from the sensory receptors.

1. .... 2. .... 3. .... 4. ....

**3** Put (✓) or (✗) :

- 1. Animals that active during the daytime are called nocturnal animals. ( )
- 2. The Egyptian jerboa lives in forests. ( )
- 3. The Egyptian jerboa has large ears which help in sensing the snakes. ( )
- 4. The owl depends on echo to determine the location of preys within the grass or beneath the snow. ( )
- 5. A bat makes sounds that hit insects and then bounce back to it, so the bat can locate them. ( )
- 6. The body senses and systems work separately when animals run away from their enemies. ( )
- 7. Some animals have abilities that humans do not have, and these abilities are called super sensory adaptations. ( )
- 8. The sensory receptors in the eyes receive the sound produced by a radio and send it to the brain. ( )

- 9. The Egyptian jerboa can jump for long distances depending on its long hind legs. (Kafr El-Sheikh 2022) ( )
- 10. Hopping of the jerboa in zigzag patterns to run away from danger is considered as a structural adaptation. ( )
- 11. The spinal cord is the main control center of the body, which helps carry messages from and to the brain. ( )
- 12. The heart and eyes are connected to the brain through blood vessels that transmit information in the form of electrical impulses. ( )
- 13. The large ears of jerboa is an example of structural adaptation. ( )
- 14. The habitat of the jerboa is similar to that of the polar bear. ( )
- 15. The tongue is the sensory organ responsible for taste, which sends messages to the brain to be processed, then identifying the food type. ( )

**4 Write the scientific term of each of the following :**

- 1. A group of different animals that look for their preys at night. (.....)
- 2. A desert rodent with a small body, large ears and long hind legs. (.....)
- 3. A property by which a bat can locate its prey insects through the sound reflected from them. (.....)
- 4. An animal that can turn its head backwards, and has a bowl-shaped face and large eyes. (Giza 2022 / Cairo 2023) (.....)
- 5. A system that controls all the body functions, and nerves are one of its parts. (Cairo 2022) (.....)
- 6. The organ responsible for processing information transmitted to it. (.....)
- 7. An organ composed of a group of nerves located in the backbone, and sends messages from and to the brain. (.....)
- 8. Organs include the eyes, nose, ears, tongue and skin, and they receive information from the surroundings and send it to the brain. (.....)
- 9. A type of nerves in the sensory organs that is responsible for receiving information from the environment. (.....)
- 10. The time taken by an organism's body to respond to different reactions. (Sharkia 2022 / Luxor 2023) (.....)

**5 Complete the following sentences :**

- 1. Echolocation is used by some animals such as ..... and .....
- 2. The brain is connected to a group of nerves that passes through the backbone which is known as the .....

- 3. Hopping of the Egyptian jerboa in zigzag patterns is considered as a ..... adaptation.
- 4. Owls can detect the places of their preys by using the sharp senses of ..... and ..... (Cairo 2023)
- 5. An owl can see everywhere by turning its ..... in all directions, while a chameleon can see everywhere by moving its ..... in opposite directions.
- 6. The presence of hair on a jerboa's feet and toes is a ..... adaptation.
- 7. If you see a cat, you have received this information through the sensory receptors in your ....., then the nerves send a signal to your ..... to identify it.
- 8. The Egyptian jerboa and the fennec fox have an excellent sense of ....., where both of them have large .....
- 9. The Egyptian jerboa has long ..... to help it jump for long distances, and it has hair on its feet and toes to help it .....
- 10. When hearing an alarm ring, the sensory receptors that are found in the ..... send a message through a network of nerves to the ..... which determines what to do to avoid danger.
- 11. When the Egyptian jerboa is in danger, it starts to run away, this action occurs in a very short time called the .....

### 6 Correct the underlined words :

1. The digestive system delivers messages through a network of nerves around all body parts. (.....)
2. The long hind legs of jerboa are considered as behavioral adaptation. (Damitta 2022) (.....)
3. The spinal cord passes through the mouth. (.....)
4. The organ that is responsible for receiving, processing and responding to information is the heart. (.....)
5. A jerboa's feet and toes are covered with feathers. (.....)
6. The sense of sight of owls is weaker than that in bats. (.....)
7. When your hand touches the spines of cactus plant, you move it away slowly. (.....)
8. Tongue is the sensory organ that is responsible for smelling sour lemon. (.....)
9. When a bat sends a sound against a wall, it returns to it. This phenomenon is called camouflage. (.....)

**7** Give reasons for :

- 1. Animals that live in hot regions become active at night.

---

---

- 2. Owls have bowl-shaped faces.

---

---

- 3. Bats can catch insects in the dark.

(Sharkia 2023)

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- 4. Owl is a nocturnal animal.

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---

- 5. The Egyptian jerboa can jump for long distances.

---

---

- 6. The presence of hair on the Egyptian jerboa's feet and toes.

---

---

- 7. The Egyptian jerboa's ears play a very important role in its survival.

---

---

**8** What happens if ... ?

- 1. Bats lose the ability to hear by using echolocation property.

---

---

- 2. Owls cannot turn their heads in all directions.

---

---

- 3. Your hand touches the spines of a barbary fig plant.

---

---

- 4. The Egyptian jerboa hears a snake moves towards it.

---

**9** Look at the opposite figure, then answer the questions below :

a. What does the figure represent ?

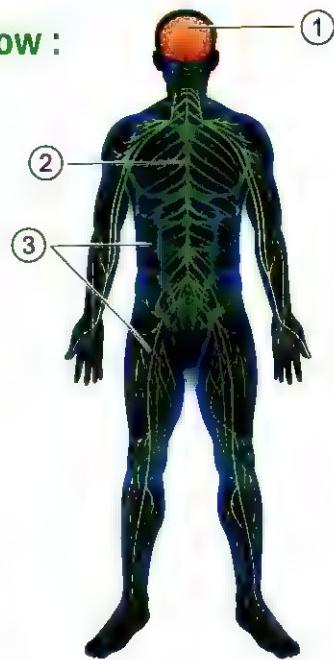
.....

b. Label the figure :

① ..... ② ..... ③ .....

c. Complete :

1. Number (.....) is found inside the backbone of the human body.
2. Number (.....) represents the main control center in the human body.
3. Number (.....) spreads all around the human body parts.



**10** Arrange the following sentences according to how the body parts of Egyptian jerboa act to avoid danger:

- (.....) The brain alerts the jerboa's legs to start moving.
- (.....) The brain processes the message telling there is a danger.
- (.....) A jerboa hears a snake moving towards it.
- (.....) The jerboa jumps in zigzag paths to run away from the danger.
- (.....) The sensory receptors that found in jerboa's ears send a message to the brain.

# LESSON THREE

## Activity 7 How the Nervous System Works

► Choose the correct answer from those between brackets :

1. The nervous system gathers information about what is going on inside and outside the body and sends this information to the ..... (blood vessels – brain)
2. The nervous system is connected by ..... that transmit messages around the body. (muscles – nerves)

### Functions of the nervous system :

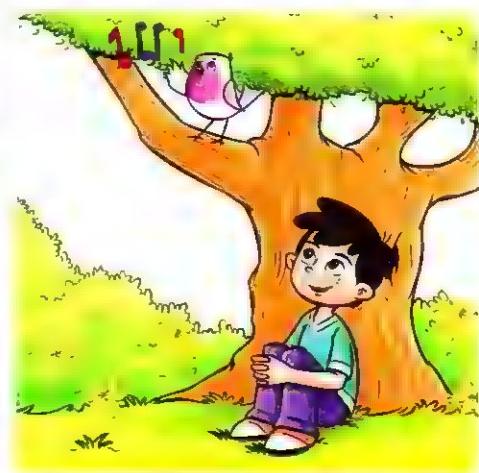
1. It gathers information through the sensory organs like the eyes, ears and skin.
2. It makes sense of (translates) these information through the brain.
3. It tells the body what to do according to these information.

#### Example:

When the ears pick up sound waves coming from a chirping bird.

The nerves in the ears send a message to the brain, which translates these sound waves.

Then, the brain sends a message to the body about what to do, such as turn to look for the bird on a tree.



#### Notes

1. Some messages, called "reflexes", are so fast that you cannot realize it such as moving your hand away when touching a very hot cup of tea.
2. Other messages are sent from and to the brain automatically, like the signal to breathe.



### Check your understanding

► Complete the following sentences :

1. The nervous system sends information through ..... to the ..... to be processed.
2. Collecting information about what happens inside and outside the body is one of the functions of the ..... system.

## Activity 8 Describing the Nervous System

► From the previous activity, we conclude that :

- The parts of the nervous system work together to :
  - Sense the environment by **sensory organs** (such as eyes, nose, mouth ... etc.).
  - Process the information to decide the best action by **brain**.
  - Send messages to the body parts by **nerves** to react to these information.
- Without all of the parts of the nervous system, the person might not receive, send or react to the information.



### Check your understanding

► Read the sentences that describe the nervous system, then write the correct term from the word bank in each blank :

**brain – reflexes – nerves – spinal cord – sensory receptors.**

1. The ..... is like the command center for your body.
2. The big nerve that passes through the backbone is called the .....
3. Messages are carried by ..... to and from the brain.
4. Messages sent by the nervous system that are often so fast that you do not think about them are called .....
5. The ..... are the nerves that lie in different places of the body and are responsible for receiving information from the environment.

In the Assessment Book :

- Try to answer :  
 • Self-Assessment ⑧

# Exercises on Lesson 3

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

1. Your sensation of hot weather depends on sensory receptors in the .....  
a. eyes.      b. nose.      c. ears.      d. skin.
2. Recognizing thunder and lightning depends on the senses of .....  
a. hearing and sight.      b. sight and smell.  
c. hearing and touch.      d. hearing and taste.
3. Closing your eyes quickly when strong light rays fall on them suddenly represents .....  
a. inhalation.      b. reflex.  
c. countershading.      d. camouflage.
4. The nervous system gather information from the environment through ..... and then process them by .....  
a. brain – nerves.      b. nerves – sensory organs.  
c. sensory organs – brain.      d. spinal cord – brain.
5. You opened the door of your house when you heard the doorbell. Which of the following statements explains the sequence of messages inside your body in this situation ? .....  
a. Ears → brain → hand.      b. Ears → hand → brain.  
c. Brain → ears → hand.      d. Brain → hand → ears.
6. You pass the football to a player in your team. Which of the following statements explains the sequence of messages inside your body in this situation ? .....  
a. Feet → nerves → brain.      b. Nerves → brain → feet.  
c. Nerves → feet → brain.      d. Brain → nerves → feet.
7. If you smell smoke from something burning nearby, then you realized you had to move away fast. This means that there is an integration between the ..... in this situation.  
(Alexandria 2022)  
a. digestive system and respiratory system  
b. digestive system and nervous system  
c. respiratory system and nervous system  
d. nervous system and urinary system
8. All the following are from the importance of the nervous system in mammals, except .....  
a. gathering information.  
b. pushing blood through blood vessels.  
c. sending signals to the body parts to react.  
d. translating information.

**2 Put (✓) or (✗) :**

- 1. The brain sends automatic signals so that we can breathe. ( )
- 2. Blinking when something becomes near to your eyes is an example of reflexes. ( )
- 3. Parts of the nervous system work together to gather and process information, then send signals. ( )
- 4. Your fingers send signals to the brain to distinguish between smooth and rough objects. ( )
- 5. Sensory organs are responsible for processing information. ( )
- 6. The function of the digestive system is distinguishing between hot and cold things. ( )
- 7. The nerves inside the body connect all parts of the nervous system together. ( )

**3 Write the scientific term of each of the following :**

- 1. It delivers messages between the spinal cord and different body organs. (.....)
- 2. The organs that receive information from the surrounding environment. (.....)
- 3. The sensory organ that can distinguish between sharp and rough voices. (.....)
- 4. A sense by which you can recognize the sour taste of lemon. (.....)
- 5. They are messages sent by the nervous system that are often so fast that you cannot realize them. (.....)

**4 Complete the following sentences :**

- 1. The ..... is the organ that sends information to the brain when you smell a perfume.
- 2. The spinal cord is a big ..... that passes through the ..... of the human body.
- 3. If you come near your dog, its nose sends a message through the nerves to its ..... alerting it that you are coming.
- 4. When you touch a very hot object, your hand moves away quickly, this action is known as ..... *(Giza 2022)*
- 5. When you hear a train horn, ..... in the ears send a message through a network of nerves to reach the .....
- 6. The ..... is the organ that is responsible for gathering surrounding sounds, while the ..... is the organ that is responsible for gathering different odors.
- 7. When an owl hears the sound of a prey, sensory receptors in the ..... send information through nerves to the ..... to be processed.
- 8. When someone cannot hear clearly, this means that he has a problem in his ..... sense.

**5** Correct the underlined words :

1. The muscles in the sensory organs within your body are responsible for receiving information from the surrounding environment. (.....)
2. When your eyes are closed, you can distinguish between your brother's voice and your friend's voice, depending on your sense of sight. (.....)
3. The spinal cord is responsible for processing sound waves coming through ears. (.....)

**6** Cross out the odd word :

1. Smell – Taste – Eyes – Hearing. (.....)
2. Eyes – Nose – Skin – Taste. (.....)
3. Spinal cord – Lungs – Nerves – Brain. (.....)

**7** Give reasons for :

1. Humans can recognize the sounds of different musical instruments.
2. The brain has an important function in the nervous system.

**8** What happens if ...?

1. The spinal cord became absent from the components of the nervous system.
2. Sensory receptors related to the eyes stopped sending messages to the brain.

**9** Look at the following figures, then complete the following sentences :

Part (1)



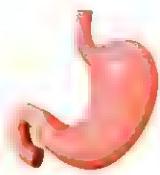
Part (2)



Part (3)

1. These body parts belong to the ..... system.
2. When you touch a freezing bottle of water, part number ..... in your hand sends a message through part number ..... to reach part number ..... which tells you that this bottle is very cold.

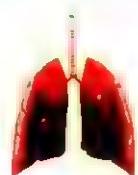
- 10** You have some pictures of different parts of the human body. Write down the organ number in front of the system to which it belongs in the following table :



①



②



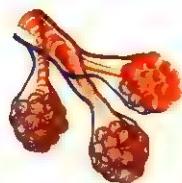
③



④



⑤



⑥

System	Organ
1. Digestive system :	.....
2. Respiratory system :	.....
3. Nervous system :	.....

# LESSON FOUR

## Activity 9 How Animals use Communication Systems

▶ Put (✓) or (✗) :

1. Humans only can communicate with each other by sounds. ( )
  2. Some animals produce different sounds to send messages to each other. ( )
- Technology systems allow humans to communicate with each other through :
    - Making phone calls.
    - Sending text messages and e-mails.
  - Animals don't use technology systems as we do, but they can still use other systems to communicate with each other.
  - We will study ants and humpback whales as examples of these animals.

### Ants :

- Ants live in **colonies** that contain thousands of individuals.
- Groups of ants within a colony have different roles, where they have developed systems that help them divide their work among themselves, so there are **nurse ants**, **scout ants** and **soldier ants**.



### How do groups of ants communicate with each other ?

When the food is low, **nurse ants** send smelly messages to **scout ants** which are responsible for locating food.

The **scout ants** respond by sending a smelly message to alert the ants where to find the food.

#### Note

The **soldier ants** also use smelly messages to communicate if there is danger nearby.

calls  
scout ants  
colonies

مكالمات  
النمل الكشاف  
مستعمرات

developed systems  
individual  
role

أنظمة منظورة  
فرد  
وظيفة / دور

nurse ants  
soldier ants  
alert

عاملات النمل  
جنود النمل  
تحذر / تنذر

nearby  
responsible for

قريب / مجاور  
مسؤول عن

## Humpback whales :

- Humpback whales sing under water to communicate with each other, where they sing a wide range of notes (tones) and a series of songs.
  - The songs of humpback whales have different sounds depending on the season, where :



In winter	In summer
<ul style="list-style-type: none"> <li>- It is the mating season.</li> <li>- Their songs have high-pitched sounds which travel better through cold water.</li> </ul>	<ul style="list-style-type: none"> <li>- It is the feeding season.</li> <li>- Their songs have low-pitched sounds which travel better through warm water.</li> </ul>

## Notes

1. High-pitched sounds such as the **sharp** voice of a **woman**.
  2. Low-pitched sounds such as the **rough** voice of a **man**.



### Check your Understanding

## ► Complete :

- When the food is low, ..... ants send ..... to ..... ants which are responsible for locating food.
  - The ..... ants use smelly messages if there is danger nearby.

► Choose the correct answer :

## Activity 10 STEM in Action

### Technology Inspired by Nature

► Bats use sound in some purposes such as :

- Communicating with each other.
- Getting information about their surroundings using their hearing sense.

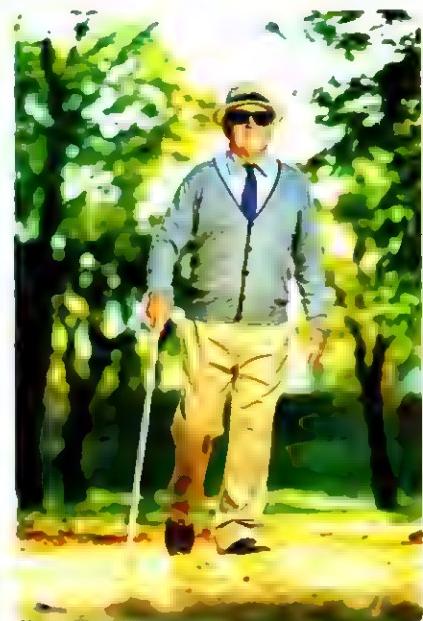
**How does the bat use its ears for echolocation to get information about its surroundings in the dark ?**



### Bat Inspired technology :

- Scientists have been inspired (get benefited) by the adaptation of bat echolocation to find ways to help **blind people** detect their surroundings, where :

Scientists have created a **special cane** that emits a high-pitched sound just like bats do.



As a blind person is walking with this special cane, an echo of this high-pitched sound is picked up by this special cane.

The echo is turned into vibrations that the person can feel with his thumb.

The vibrations of the special cane tell the blind person the direction of the obstacles and objects around him.

 **Note**

Humans cannot hear the high-pitched sounds produced either from bats or the special cane of blind people.

- In this table we can summarize the similarities and differences between the special cane of blind person and bat echolocation.

Special cane of blind person	Bat
<b>Similarities</b>	
<ul style="list-style-type: none"> <li>- The special cane of blind person and bats emit a <b>high-pitched sound</b> that bounces off objects as an echo.</li> <li>- This special cane and bats <b>receive the echo</b> that can tell how far away objects are.</li> </ul>	
<b>Differences</b>	
<ul style="list-style-type: none"> <li>- This special cane picks up an echo from the sound it emits and <b>changes</b> it into a vibration that can tell the blind person where objects are around him.</li> </ul>	<ul style="list-style-type: none"> <li>- Bats pick up an echo from the sound they emit but they <b>don't change</b> it into vibrations.</li> </ul>



### Check your understanding

- Put (✓) or (✗) :

1. Bats make low-pitched sound and then listen for an echo. (      )
2. Bats can change the echo into vibrations. (      )

### Review on Concept (1.2)

To review this concept look at the **Assessment Book**  
**"Part 2 : Final Revision".**

In the Assessment Book :

Try to answer :

- Self-Assessment (9)
- Model Exam on Concepts (1.1) & (1.2)

# Exercises on Lesson 4

● Understand

● Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. Sending smelly messages when there is a shortage of food is the role of .....  
a. queen ants.    b. nurse ants.    c. scout ants.    d. soldier ants.
- 2. Locating food is the role of .....  
a. queen ants.    b. nurse ants.    c. scout ants.    d. soldier ants.
- 3. Alarming the colony from dangers is the role of .....  
a. queen ants.    b. nurse ants.    c. scout ants.    d. soldier ants.
- 4. Humpback whales sing during ..... months, which is the mating season.  
a. winter    b. summer    c. spring    d. autumn
- 5. Sense organs collect information and send signals to ..... for processing and understanding.  
(Port Said 2022)  
a. hands    b. legs    c. brain    d. stomach
- 6. Bats use their ..... to get information about their surroundings in the dark.  
a. nose    b. tongue    c. eyes    d. ears    (Gharbia 2022)
- 7. Echolocation in some animals is the use of ..... pitched sounds for finding food.  
a. medium    b. low    c. very low    d. high
- 8. ..... use echolocation by bouncing high-pitched sounds in the air.  
a. Bats    b. Dolphins    c. Whales    d. Snakes    (Alex. 2023)
- 9. The echo is turned into ..... that a blind man can feel in his thumb while holding his special cane.  
a. vibrations    b. light    c. heat    d. water
- 10. The blind person's cane and ..... emit a high-pitched sound that bounces off objects forming an echo.  
a. lizards    b. polar bears    c. bull sharks    d. bats
- 11. Songs of humpback whales in winter are characterized by each of the following except .....  
a. having high-pitched sounds.    b. travelling better through cold water.  
c. having soft sounds.    d. having low-pitched sounds.
- 12. All the following sentences describe humpbacks' life, except .....  
a. they can communicate in cold and warm water.  
b. they mate in winter months.  
c. they have a weak hearing sense.  
d. they communicate with each other through sounds.

**2** Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Nurse ants	a. are responsible for reproduction and laying eggs.
2. Scout ants	b. are responsible for warning from dangers.
3. Soldier ants	c. are responsible for locating food. d. are responsible for sending smelly messages when the amount of food decreases.

1. .... 2. .... 3. ....

**3** Put (✓) or (✗) :

- 1. It is impossible to design technology inspired by the adaptations of some living organisms around us. ( )
- 2. A special cane is invented to help a person who has lost the sense of hearing. ( )
- 3. The sound pitch from a blind person's cane is too high for humans to hear. ( )
- 4. Echo is turned into light that a blind man can feel while holding his special cane. ( )
- 5. Bats have the ability to change echo into vibrations just as the canes of blind persons do. ( )
- 6. Animals use technological systems as we do. ( )
- 7. Animals communicate with each other by using different senses. ( )
- 8. Humpback whales communicate with each other through flashing. ( )
- 9. Humpback whales produce more than one type of songs. ( )
- 10. Humpback whales can sing under water. ( )
- 11. Sense organs can decode the information that is sent by the brain. ( )

**4** Correct the underlined words :

- 1. Groups of ants within a colony have similar roles. (.....)
- 2. Scout ants are responsible for alarming the colony in danger. (.....)
- 3. Humpback whales have similar sounds according to the season. (.....)
- 4. Humpback whales produce low-pitched sounds in winter. (.....)
- 5. Low-pitched sounds travel better through cold water. (.....)

**5** Write the scientific term of each of the following :

- 1. A season in which the humpback whale produces high-pitched sound. (.....)
- 2. A season in which the humpback whale produces low-pitched sound. (.....)

- 3. Small living organisms that live in colonies and communicate with each other by smelly messages to perform different roles. (.....)
- 4. A group of ants which is responsible for sending smelly messages when there is a shortage of food. (Alex 2023) (.....)
- 5. Pitched sounds which travel through cold water better than through warm water. (.....)
- 6. Pitched sounds which travel through warm water better than through cold water. (.....)
- 7. Sense organ that can detect sound energy. (.....)
- 8. Sense organ that can detect light energy. (Giza 2022) (.....)
- 9. A living organism that can fly and depend on the echolocation property to get information about its surroundings in the dark. (.....)
- 10. A simple tool (device) used by blind people to walk safely. (.....)

### 6 Complete the following sentences :

- 1. Bats and the special cane of blind people are similar in using ..... property to locate objects.
- 2. A group of ants sends ..... messages to communicate with each other.
- 3. Ants use their sense of ..... to communicate with each other.
- 4. Ants within a colony are divided into several groups such as ..... ants, ..... ants and ..... ants, where each group do a specific role.
- 5. Humpback whales communicate with each other by using the sense of ..... , where they sing a wide range of ..... and a series of ..... (Minia 2023)
- 6. In winter months, the songs of humpback whales have ..... pitched sound, because these sounds travel better through ..... water.
- 7. In ..... months, the songs of humpback whales have ..... pitched sound, because these sounds travel better through warm water.
- 8. Humans can communicate with each other where ears of human detect ..... energy and eyes of human detect ..... energy.
- 9. Ants are similar to the ..... tree in that both of them send a smelly messages for communication.
- 10. The echo that is picked up by the special cane of a blind person is turned into ..... that the person can feel them with his thumb.

**7 Give reasons for :**

- 1. The nurse ants send smelly messages to scout ants.
- .....
- 2. The soldier ants use smells in their communication.
- .....
- 3. The songs of humpback whales have high-pitched sounds during winter months.
- .....
- 4. Humpback whales sing different songs.
- .....
- 5. The echo that is picked up by the special cane of blind people is turned into vibrations.
- .....
- 6. The blind people cannot hear the sound that emits from their special canes.
- .....

**8 What happens if ... ?**

- 1. The smell sense of ants becomes weak.
- .....
- 2. The amount of food in the ants colony decreases.
- .....
- 3. There is a danger near to an ants colony.
- .....
- 4. High-pitched sound that is produced by the blind person's cane hits an object.
- .....
- 5. Bats cannot use echolocation property.
- .....
- 6. There is a wall in front of a blind person uses his special cane.
- .....
- 7. The hearing sense of humpback whales becomes weak.
- .....

# Model Exam 1

Total mark

15

**1** (A) Choose the correct answer :

(5 marks)



**(B) Give a reason for :**

The Egyptian jerboa has long hind legs.

## 2 (A) Correct the underlined words :

(5 marks)

- When you hear the fire alarm, your eyes send a signal to the brain. (.....)
  - The spinal cord is responsible for processing the information coming through ears. (.....)
  - The dog has sharp senses of smell and taste. (.....)
  - The sense of sight in bats is stronger than that in owls. (.....)

### (B) What happens if ... ?

Owls cannot turn their heads in all directions

**3 (A) Write the scientific term of each of the following :** (5 marks)

1. A living organism that can fly and depend on the echolocation property to get information about its surroundings in the dark. (.....)
2. A season in which the humpback whale produces low-pitched sound. (.....)
3. Sense organ that can detect light energy. (.....)
4. A group of messages sent by nervous system that are often so fast that you cannot realize them. (.....)

**(B) Mention two devices that humans can use to communicate with their surroundings, where their ideas are inspired from some animal adaptations. And then mention the name of these two animals.**

<b>Devices</b>	<b>Inspired from the adaptation of</b>
1. ....	.....
2. ....	.....

# Model Exam 2

2

## on Concept (1.2)

Total mark

15

### 1 (A) Write the scientific term of each of the following :

(5 marks)

1. The time taken by an organism's body to respond to different information around it. (.....)
2. A sense by which you can recognize the sour flavor of vinegar. (.....)
3. A system that controls all the body functions and nerves are one of its parts. (.....)
4. The organ which receives and processes the messages sent from the sensory receptors that are found in a jerboa's ears. (.....)

### (B) Look at the opposite figure that shows the structure of the human nervous system, then answer the questions :

1. Which part spreads all around the human body ?

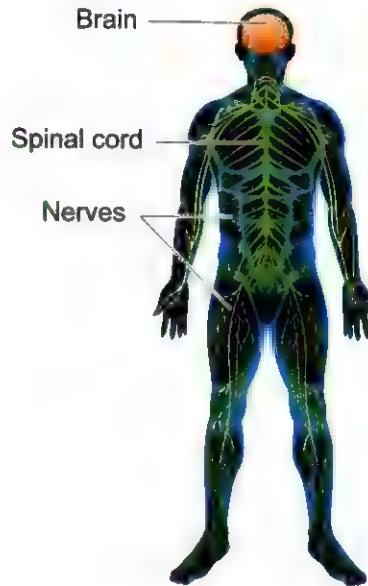
.....

2. Which part is found inside the backbone of the human body ?

.....

3. Which part represents the main control center in the human body ?

.....



### 2 (A) Complete the following sentences :

(5 marks)

1. The ..... is the organ that sends information to the brain when you smell the scent of a perfume.
2. Ants use their sense of ..... to communicate with each other.
3. Hopping of the Egyptian jerboa in zigzag patterns is considered as a ..... adaptation.
4. Owls can detect the places of their preys by using the super senses of ..... and .....

**(B) Order the following statements which explain how the brain processes information :**

- (.....) The brain sends a signal to the muscles to move to start the race.
- (.....) Hearing the whistle sound to start the race.
- (.....) The brain processes information.
- (.....) The nerves of the ears send a signal to the brain.

**3 (A) Put (✓) or (✗) :**

*(5 marks)*

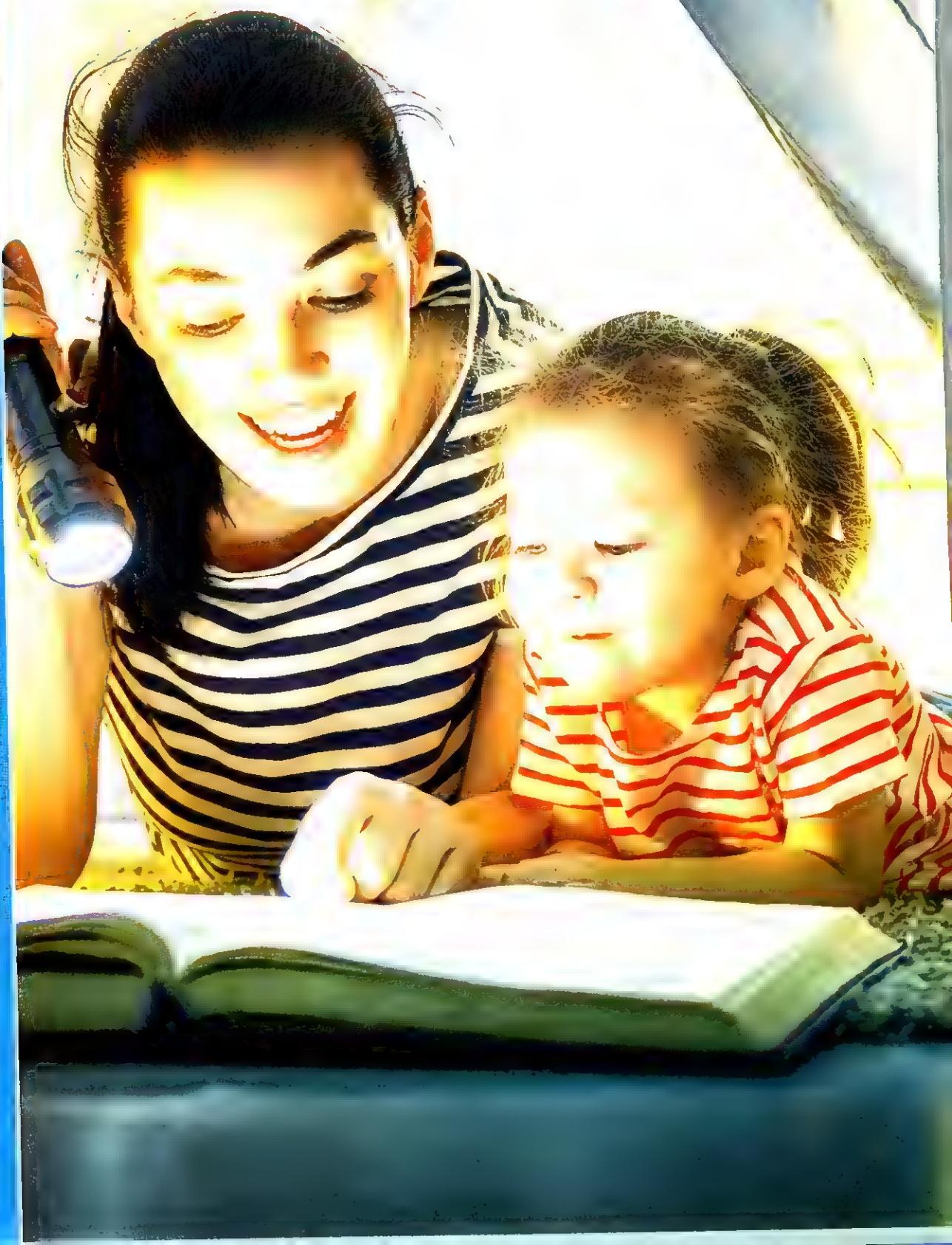
1. Animals use technological systems as we do. ( )
2. Humpback whales communicate with each other through flashing. ( )
3. The sound pitch from a blind person's cane is too high for humans to hear. ( )
4. Echolocation is a type of communication between owls. ( )

**(B) What happens if ... ?**

The amount of food in ants colony decreases.

.....

# 1.3 Light and Sight





## Learning outcomes

**By the end of this concept, your child will be able to :**

- Describe how light transfers energy across distances.
- Develop a model that describes how the behavior of light enables the eye to see objects.
- Explain how adaptations help some animals gather information in the dark.
- Argue, using evidence that light allows for the transfer of information through systems communication.

## Key vocabulary

- |                            |              |
|----------------------------|--------------|
| • Feature                  | • Light      |
| • Matter                   | • Opaque     |
| • Eye pupil                | • Reflection |
| • Transparent              |              |
| • Transferring information |              |

## Notes For Parents On Concept [1.3]

Lessons	Activities	What you should do with your child
1	Activity 1	Discuss with your child how the vision process occurs in humans and animals.
	Activity 2	Discuss with your child how humans and fishing cats see things in low-light places.
	Activity 3	Explain to your child the meaning of "sources of light" and mention some examples of them.
2	Activity 4	Let your child do an experiment to know how light interact with different types of materials.
	Activity 5	Discuss with your child the meaning of opaque and transparent objects, and how the reflected light depends on the smoothness of the reflecting surface.
3	Activity 6	Discuss with your child the way through which firefly beetles communicate.
	Activity 7	Let your child classify the different types of communication used by humans, animals or both of them.
4	Activity 8	Explain to your child the meaning of "code" that humans can use to transfer information.

# LESSON ONE

## Activity 1 | Can You Explain ?



Human



Fishing cat

- In the previous concept, you have learned that animals have senses like humans.
- Humans and animals have nerves that send information from the sense organs to the brain for processing information.

**Do you know what is the organ that is affected by light in humans and animals and how they can see things in low-light places ?**

- **The eye** is the sense organ of sight that is affected by light in humans and animals.
- **Humans** need more light in low-light places to see clearly.
- **Some animals** such as **fishing cat** can see better than humans in the low-light places.

► **In this concept, we will study :**

- Some animals that can hunt in the low-light places.
- Light is a form of energy.
- Some special structures in the eyes of some animals.
- Reflection of light.
- How we can see different objects around us.
- How some living organisms use light in communication.

**Activity 2 Hunting with Night Vision**

► Look at the opposite picture, then put (✓) or (✗) :

1. Eye is the sense organ that humans depend on to see the surroundings. ( )
2. Presence of sound is important for humans to see the surroundings clearly. ( )

**Night vision in humans :**

- Human eyes need more light to see well in the low-light places.
- Without more light humans would need a device known as "night vision goggles" to see in the dark.



Night vision goggles

**Night vision in animals :**

- The structure of eyes of some animals help them see in the dark such as the fishing cat.

**The fishing cat**

- It is a wild cat and considered as one of nocturnal animals that hunts for food at night.
- The fishing cat's eyes seem to glow in the dark because :
  - 1- It has a mirror-like membrane at the back of its eyes.
  - 2- When the light enters the fishing cat's eyes, it bounces (reflects) off this membrane, allowing its eyes to collect more light.
- This structural adaptation of the fishing cat's eyes, is found in all cats and allow them to have excellent night vision to hunt in the low-light places.



## The ability of humans and nocturnal animals to see in the dark :

Points of comparison	Humans	Nocturnal animals
• Size of the eye :	Small eye	Big eye
• Eye pupil :	Opens narrower   Human eye	Opens wider (to allow more light enter their eyes)   Cat eyes

### Note

Some nocturnal animals can see in the weakest light levels, but in complete darkness they depend on other senses such as hearing and smelling that help them to hunt their preys and to avoid their predators.

### ► What happens if ... ?

**The fishing cat eyes have no mirror-like membrane.**

It cannot see clearly and hunt at nights.



### Check your understanding

#### ► Put (✓) or (✗) :

1. The type of adaptation in the fishing cat to see in the low-light places is a behavioral adaptation. ( )
2. All cats have a mirror-like membrane in their eyes. ( )

#### ► Choose the correct answer :

If the human eyes contain a mirror-like membrane, so his eyes ..... in the low-light places.

- a. gather low amount of light
- b. need a night vision goggles
- c. appear black
- d. appear bright

## Activity 3 What Do You Already Know About Light and Sight ?

### Sources of light :

#### A source of light :

It is something that emits (gives off) its own light.



Electric lamps



The Sun



Candles



Flashlight

**Examples of sources of light**



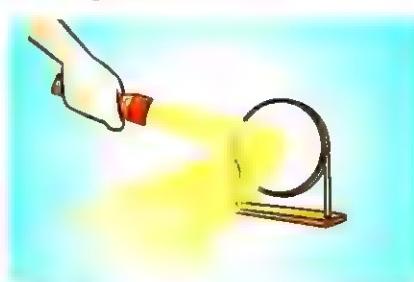
Fire

#### Note

There are other objects that don't emit light, but they reflect the light falling on them, so they are not considered as sources of light such as :



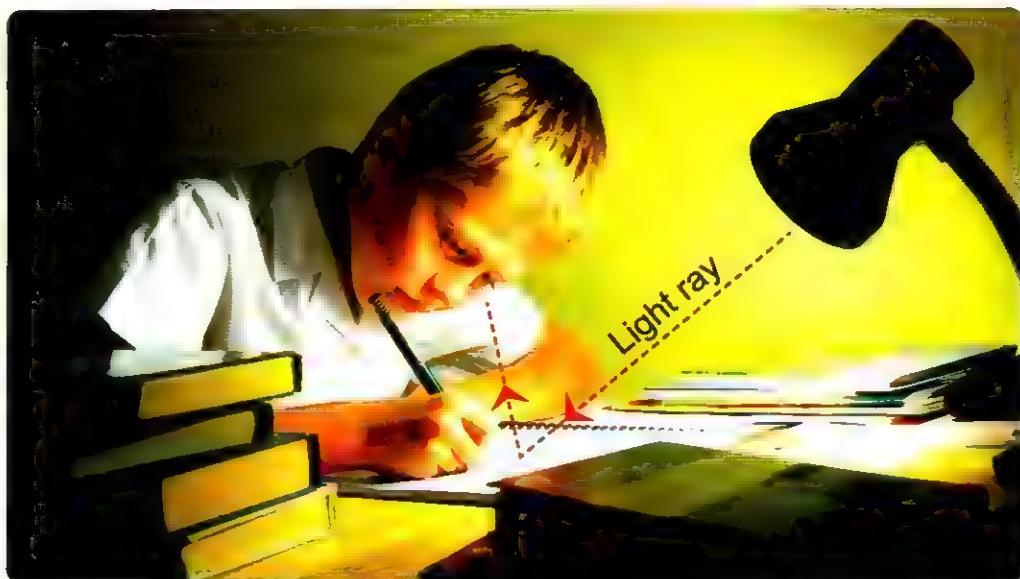
The moon (reflects the sunlight)



The mirror (reflects the flashlight)

## How we see :

When the source of light emits its own light rays they fall on objects, the light rays bounce off these objects and reach our eyes, so we can see these objects, as shown in the picture below :



From the previous explanation we conclude that :

### Light :

It is a visible form of energy that travels in the form of waves.

#### Note

In complete darkness, we can't see anything because without light bouncing off the objects into our eyes, everything will look black.



### Check your understanding

#### ► Complete :

There are many sources of light such as ..... , ..... and .....

#### ► Put (✓) or (✗) :

1. The light falling on objects bounces back to reach the eye so that we can see these objects. ( )
2. The moon is considered a source of light, so it appears bright at night. ( )

**In the Assessment Book :**

Try to answer :

Self-Assessment (10)

# Exercises on Lesson 1

● Understand

● Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. Which of the following organs are working together for seeing different objects ? .....  
a. Nose and brain.      b. Eyes and brain.  
c. Ears and brain.      d. Tongue and brain.
- 2. Humans have ..... eyes than nocturnal animals.  
a. bigger      b. smaller  
c. stronger      d. sharper
- 3. The pupils of human eyes open ..... that of nocturnal animals.  
a. typical to      b. narrower than  
c. wider than      d. similar to
- 4. The wide eye pupils of fishing cat, allows ..... amount of light to enter its eyes than those of human eyes.  
a. little      b. large      c. very small      d. small
- 5. Nocturnal animals depend on all the following senses to find out their preys at night, except .....  
a. sight sense.      b. hearing sense.  
c. taste sense.      d. smelling sense.
- 6. The mirror-like membrane of the fishing cat is present .....  
a. inside the stomach.      b. at the back of the brain.  
c. inside the lungs.      d. at the back of the eye.
- 7. Which of the following do not need a big amount of light to see in the dark ? .....  
a. Both humans and cats.      b. Neither humans nor cats.  
c. Cats only.      d. Humans only.
- 8. To detect the place of a table in a completely dark room, you can depend on .....  
a. sight sense.      b. touch sense.  
c. taste sense.      d. hearing sense.
- 9. If someone walking in a dark place without hitting anything around him, so this person may .....  
a. have a big ability to taste.      b. have a big ability to breathe.  
c. have a big ability to smell.      d. wear a night vision goggles.
- 10. The character that helps the fishing cat to hunt a prey at night, is its ability .....  
a. to see the sunlight.      b. of poor night vision.  
c. to digest its prey easily.      d. of excellent night vision.

- 11. The eyes of fishing cats glow at night, because their eyes .....
  - a. emit their own light.
  - b. can reflect light.
  - c. are small in size.
  - d. have narrow pupils.
  
- 12. The sight process occurs as follows .....
  - a. light falls on the eyes, then reflected to the objects.
  - b. light falls on the objects, then reflected into the eyes.
  - c. sound falls on the ears, then reflected to the objects.
  - d. sound falls on the objects, then reflected into the ears.
  
- 13. The function of the mirror-like membrane in the fishing cat's eyes, looks like the function of .....
  - a. night vision goggles.
  - b. radio.
  - c. black paper.
  - d. white paper.
  
- 14. In the fishing cat's eyes, the mirror-like membrane is an important structure because it helps them to ..... at night.
  - a. sleep
  - b. breathe
  - c. keep their body warm
  - d. hunt a prey
  
- 15. All the following things are considered as light sources, except .....
  - a. the Sun.
  - b. fire.
  - c. eyes.
  - d. the light lamp.(Cairo 2022)
  
- 16. We can see both the Sun and the moon, because light .....
  - a. bounces off both of them.
  - b. is emitted from both of them.
  - c. bounces off the Sun and is emitted from the moon.
  - d. bounces off the moon and is emitted from the Sun.
  
- 17. The energy which must present to make our eyes able to see the objects around us is ..... energy.
 (Cairo 2022)
  - a. sound
  - b. electric
  - c. light
  - d. magnetic

**2 Put (✓) or (✗) :**

- 1. Eyes are considered as sensory organs of light, not as a source of light. ( )
- 2. Sight is the sense on which humans and animals depend to see the surroundings. ( )
- 3. Cats have excellent night vision, while humans are not. ( )
- 4. Both of the moon and the cat's eyes reflect the light that falling on them. ( )
- 5. The mirror-like membrane that is present at the back of a fishing cat's eyes, is not present in other cat species. ( )
- 6. We can see the mirror that presents in a completely dark room. ( )
- 7. Big eyes of fishing cat allow to gather and reflect any little amount of light. ( )

- 8. If the human has a mirror-like membrane at the back of his eyes, he can see clearly in the low-light places. ( )
- 9. The light that enters the human eyes allows him to distinguish between weak and strong sounds. ( )
- 10. The moon is not considered as a light source. (Cairo 2023) ( )
- 11. We can see the moon although it doesn't emit any light. ( )

### 3 Complete the following sentences using the words below :

(source of light – mirror-like membrane – more light – bounce off)

1. Human eyes need ..... to see clearly in the low-light places.
2. All cats have a ..... at the back of their eyes.
3. Any object that gives off its own light is called a .....
4. We can see objects when the light rays ..... these objects to our eyes.

### 4 Write the scientific term of each of the following :

- 1. The organ that is affected by light and responsible for sight. (.....)
- 2. A species of wild cats, whose eyes glow at night. (.....)
- 3. Objects that emit their own light. (.....)
- 4. The organ that is responsible for processing information received by eyes, to know and recognize the surroundings. (.....)
- 5. A body that appears lighted in the sky, but it is not considered as a source of light. (Giza 2023) (.....)
- 6. A tool that the human can depend on to see in the dark. (.....)
- 7. The structural adaptation that gives fishing cat an excellent night vision. (.....)
- 8. The visible form of energy that enables us to see. (Cairo 2023) (.....)

### 5 Correct the underlined words :

1. Humans and cats are similar in their seeing ability at night. (.....)
2. The energy that helps humans and animals see, is the sound energy. (Minia 2022) (.....)
3. The moon is one of the light sources in the sky. (Giza 2023) (.....)
4. The system that works with the eyes of living organisms for seeing objects is the digestive system. (.....)
5. Cats eyes glow at night due to the presence of a mirror-like membrane at the front of their eyes. (.....)

6. Sound is a visible form of energy that bounces off objects into our eyes. (.....)
7. Eyes send messages to the heart for processing information. (.....)
8. In a completely dark room, everything looks red due to the absence of light. (.....)

### 6 Complete the following sentences :

- 1. The fishing cat can hunt at night depending on the excellent sense of .....
- 2. The fishing cat can hunt at night due to the bouncing off ..... energy.
- 3. The eyes of fishing cat have a mirror-like membrane bounces off the light, and this is considered as a ..... adaptation. (Beni-suef 2022)
- 4. Eyes of human are ..... than eyes of nocturnal animals, and pupils of nocturnal animals open ..... than that of human.
- 5. In complete darkness, nocturnal animals depend on other senses such as ..... and .....
- 6. To see things clearly at night, humans need a source of ..... but ..... animals can hunt at night depending on their excellent night vision.
- 7. Human can see objects which give off their own light or objects which ..... light.
- 8. Among the objects which give off their own light are the Sun and ..... , while ..... and ..... are objects that bounce off light.

### 7 Give reasons for :

- 1. The fishing cat's eyes seem to glow in the dark.
- .....  
.....

- 2. Candle is considered as a source of light.
- .....  
.....

### 8 What happens if ... ?

- 1. The mirror-like membrane in the fishing cat's eyes is not present.
- .....  
.....

2. The moon can't reflect the sunlight.

**9** Cross out the odd word :

1. Flashlight – The moon – Fire.
2. The moon – Mirror – Candle.

(Minia 2023) (.....)

(.....)

**10** Study the following three figures, then put (✓) or (✗) :

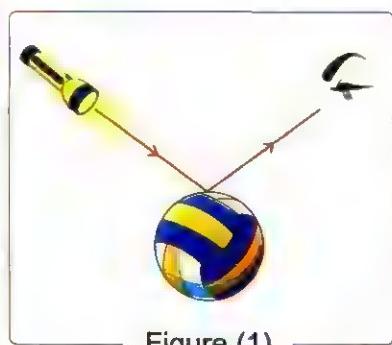


Figure (1)

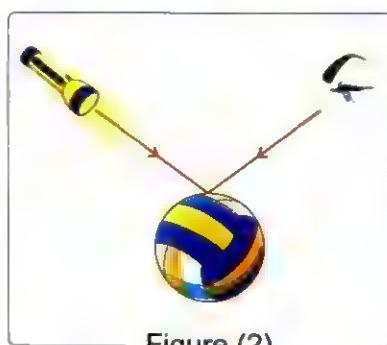


Figure (2)

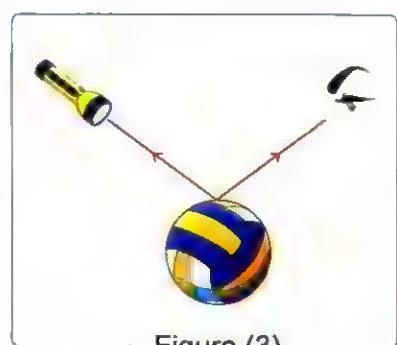


Figure (3)

1. Human's eyes can see the ball in figure (3), because the ball emits light. ( )
2. Figure (2) is not correct, because human's eyes don't emit light. ( )
3. Figure (1) is correct, because the light ray of the flashlight bounces off the ball to the human's eyes. ( )

## Activity 5 Light Strikes Matter

- In this activity, we will study what happens to light when it hits different types of matter.

### Light strikes matter

Light is a form of energy that travels in straight lines in the form of light waves.



Light reflection

#### When light hits an object :

- Some of the light energy is absorbed by the object's surface.
- Some of the light energy reflects (bounces) off the object's surface.
- Some of the light energy may go through the object.

So, according to the previous explanation, objects can be classified into two groups which are :

Opaque objects	Transparent objects
<ul style="list-style-type: none"> <li>- They are objects that don't allow light to pass through.</li> <li>- Things can't be seen through them.</li> </ul> <p>Opaque object</p> 	<ul style="list-style-type: none"> <li>- They are objects that allow light to pass through.</li> <li>- Things can be seen through them.</li> </ul> <p>Transparent object</p> 
<p><b>Examples :</b> rocks, wood, metals and the human body.</p>	<p><b>Examples :</b> air, water, glass windows and lenses.</p>

### Why do you see your body shadow ?

Your body is an opaque object that forms shadow, because the light that hits your body either bounces off or is absorbed but no light passes through your body.



# LESSON TWO

## Activity 4 Light Reflection

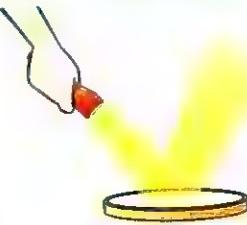
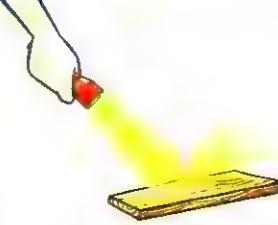
### ► Choose the correct answer :

Which one of the following objects is shiny and smooth ? .....

- a. Plastic spoon.      b. Wooden chair.      c. Mirror.      d. T-shirt.

In this activity, we will do an experiment that shows how light interacts with different types of materials :

**Materials :** a flashlight – a mirror – a piece of wood – a piece of plastic – a piece of metal – a piece of cloth – paper.

Steps	Figures	Observations
1. Turn on the flashlight and direct it towards a mirror.		- The mirror reflects most amount of the light.
2. Turn on the flashlight and direct it towards a piece of wood.		- The piece of wood reflects less amount of the light.
3. Repeat the previous step using the other materials.		

### Conclusions :

1. Shiny and smooth materials reflect large amount of the light that falls on them, such as the mirror and the piece of metal.
2. Rough materials reflect small amount of the light that falls on them, such as the piece of wood, the piece of plastic, the piece of cloth and paper.



## Check your understanding

### ► Put (✓) or (✗) :

1. Shiny objects reflect light better than rough objects. ( )
2. Wood reflects more light than a mirror does. ( )

interact  
shiny

يتفاعل  
للمع

توجيه  
ناعم

موجة  
خشنة

materials  
rough

# Exercises on Lesson 2

● Understand

○ Apply

● Higher Thinking Skills

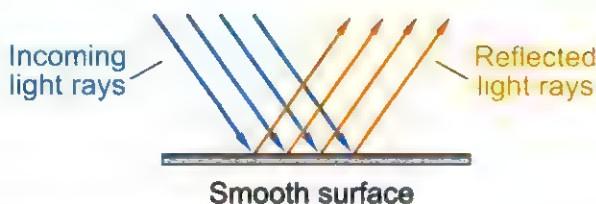
## 1 Choose the correct answer :

- 1. Light travels in ..... lines in the form of waves.
  - a. curved
  - b. zigzag
  - c. straight
  - d. circular
- 2. When light rays hit an object, all the following sentences are correct, except .....
  - a. some of this rays is absorbed by the object.
  - b. some of this rays is bounced off the object.
  - c. some of this rays may go through the object.
  - d. all of this rays are absorbed by the object.
- 3. A shadow of an object is formed because .....
  - a. light can pass through the object.
  - b. light cannot pass through the object.
  - c. this object is made of glass.
  - d. this object is transparent.
- 4. Opaque material .....
  - a. allows light to pass through.
  - b. absorbs some of light that falls on it only.
  - c. reflects some of light that falls on it only.
  - d. absorbs some of light that falls on it and reflects the other.
- 5. All of the following are transparent objects, except .....
  - a. glass.
  - b. water.
  - c. paper.
  - d. air.
- 6. ..... allows most of light to pass through, while ..... don't.
  - a. Air – glass
  - b. Glass – air
  - c. Wood – glass
  - d. Glass – wood
- 7. Mirror causes falling light rays to .....
  - a. pass through it.
  - b. reflect at the same angle they strick the mirror.
  - c. reflect in different directions.
  - d. diffuse like that of rough surfaces.
- 8. Our eyes, .....
  - a. can see through both opaque and transparent objects.
  - b. cannot see through both opaque and transparent objects.
  - c. can see through opaque objects, but not through transparent objects.
  - d. can see through transparent objects, but not through opaque objects.

► The direction of the reflected light rays depends on the smoothness of the surface, where :

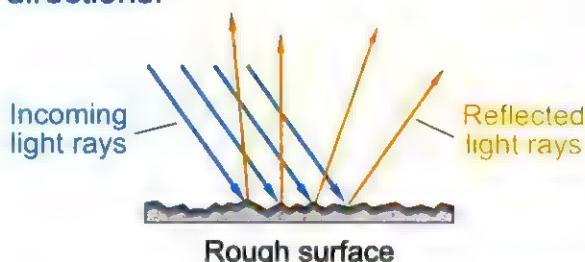
**Smooth Surface**

- If the surface is **smooth** (such as a mirror), the light rays will reflect **in one direction** with the same angle at which they strike (hit) the object originally.



**Rough Surface**

- If the surface is **rough** (such as a painted surface), the reflected light rays will **scatter or diffuse** in different directions.



► How does light striking matter make it possible for humans and animals to see ?

When light rays strike an object, light reflects (bounces) off this object.

The reflected light travels in a straight line into the eyes.

Special nerves in the eyes send messages to the brain.

The brain interprets the messages as an image of this object.



**Check your understanding**

► Write the scientific term :

1. Objects that allow light to pass through. ( ..... )
2. Objects that don't allow light to pass through. ( ..... )

In the Assessment Book :

Try to answer :

Self-Assessment (11)

**6 Complete the following sentences :**

- 1. Light travels in ..... lines.
- 2. Light travels in the form of .....
- 3. Objects that light can't pass through are called ....., while objects that allow light to pass through are called .....
- 4. A tree forms a shadow as it is an ..... object that doesn't allow ..... to pass through.
- 5. Cloth and paper are considered ..... surfaces that scatter or diffuse .....
- 6. Human body, wood and ..... are considered ..... materials which .....
- 7. Rough materials reflect light ..... than smooth materials.
- 8. Things can be seen through ..... objects such as ..... and .....

**7 Give reasons for :**

- 1. Shadow of an opaque body is formed when light falls on it.

.....  
.....

- 2. You can see an object placed behind a glass cup.

.....  
.....

- 3. A mirror can reflect light better than a painted surface.

(Giza 2023)

.....  
.....

**8 What happens if ... ?**

- 1. You place a wood sheet between a light source and a wall.

.....  
.....

- 2. Light falls on a transparent body such as a glass window.

.....  
.....

- 3. Light falls on a rough surface.

.....  
.....

9. If there are two sheets, one is made of wood and the other is made of glass, ....  
 a. you can see the glass sheet through the wood sheet.  
 b. you cannot see the wood sheet through the glass sheet.  
 c. you can see the wood sheet through the glass sheet.  
 d. light can pass through both sheets.
10. Light rays can pass through lenses, so they are made up of .....  
 a. wood.      b. paper.      c. glass.      d. metal.

**2 Choose from column (B) what suits it in column (A) :**

(A)	(B)
1. Mirror	a. It is a transparent piece that allows light to pass through.
2. Piece of cloth	b. It is considered as a source of light.
3. Reflected light	c. It is a rough surface that scatters reflected light rays.
4. Lenses	d. It is the light that bounces off a reflecting surface. e. It is a smooth and shiny surface that reflects most of falling light.

1. ....      2. ....      3. ....      4. ....

**3 Put (✓) or (✗) :**

- 1. Transparent objects include mirrors and lenses. ( )
- 2. Rough objects tend to reflect light better than smooth objects. ( )
- 3. Both wooden piece and paper reflect incoming light rays at the same angle at which they struck them. ( )
- 4. Mirror reflects most of incoming light rays that fall on it. ( )
- 5. The light reflection depends on smoothness of the object's surface. ( )

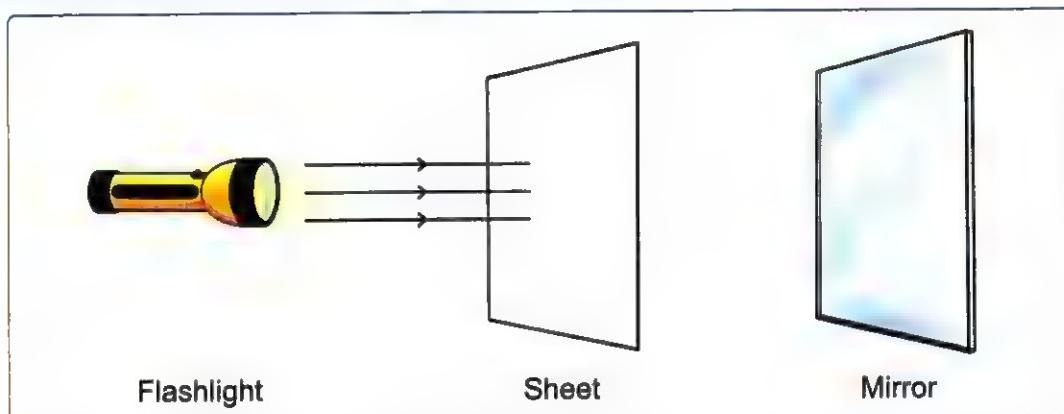
**4 Write the scientific term of each of the following :**

- 1. Materials that allow light to pass through. (Cairo 2022 / 2023) (.....)
- 2. Materials that we cannot see through it. (.....)
- 3. A type of surfaces that reflects light in different directions. (.....)

**5 Correct the underlined words :**

- 1. We see the objects as a result of the absorption of light rays into our eyes. (.....)
- 2. Opaque materials include water, glass, air and lenses. (.....)
- 3. Rough objects reflect light rays in one direction at the same angle at which they struck the object. (.....)

- 13 Study the following figure that shows a sheet placed between a flashlight and a mirror, then choose the correct answer :



1. The mirror can reflect the light rays, if the sheet is made up of .....  
( wood – glass )
2. If we replaced the sheet with another mirror, it will ..... the light rays.  
( pass – reflect )

**9** Arrange the following statements to show the correct sequence of how humans see different objects :

- (.....) Special nerves in the eyes send messages to the brain.
- (.....) The reflected light rays travel in a straight line into the eyes.
- (.....) The brain interprets the messages as an image.
- (.....) Light rays reflect off objects around us.

**10** Look at the following figures, then answer the questions below :

(Giza 2022)

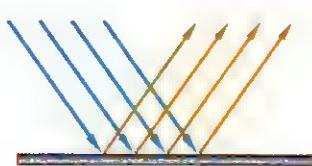


Figure (a)

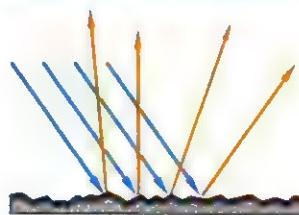


Figure (b)

**1. Complete :**

- The surface in figure (a) is .....  
- Because .....
- The surface in figure (b) is .....  
- Because .....
- In the previous two figures, the falling and reflected rays show that light travels in ..... lines.

**2. Choose :**

The surface in figure (a) may be .....

- plastic.
- wood.
- mirror.
- cloth.

**11** Classify the following materials into smooth materials and rough materials :

“ Cloth – Mirror – Wood – Metal – Paper ”

Smooth materials	Rough materials
.....	.....
.....	.....

**12** Classify the following materials into opaque objects and transparent objects :

“ Wood – Air – Water – Metal – Lenses ”

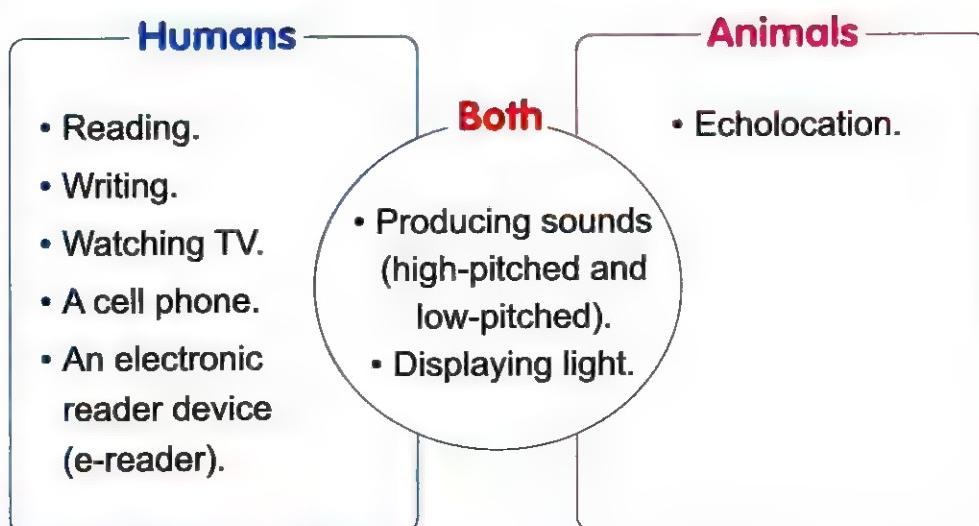
Opaque objects	Transparent objects
.....	.....

**Activity 7****What Do You Already Know About Communication and Information Transfer ?**

- There are some similarities and differences between types of communication and transferring information in humans and animals.



► The following figure shows some different types of communication in humans, animals and both :

**Check your understanding**

► Choose the correct answer :

1. .... is considered as a type of communication that is used by humans only.  
( Echolocation – A cell phone – Displaying light )
2. .... is considered as a type of communication that is used by animals only.  
( Writing – Echolocation – High-pitched sound )

In the Assessment Book :

Try to answer :

Self-Assessment (12)

# LESSON THREE

## Activity 6 Firefly Light Show

► Look at the opposite photo, then put (✓) or (✗) :

1. The firefly beetle is considered as a type of insect. ( )
2. The firefly beetle can produce light. ( )



Firefly beetle

### How do fireflies beetles produce the lights they use to communicate ?

- Fireflies beetles are type of insects that can produce a chemical reaction inside their bodies that allows them to light up and communicate with other fireflies.

### ► How do fireflies use their senses to communicate ?

1. Fireflies use their wings to form different flash patterns to :
  - Warn off other firefly beetles from predators.
  - Attract a mate to reproduce.
2. They flash at regular periods of time, but if there is another group of fireflies flashing nearby, they will change their own flash pattern to match the flash pattern of the other group to communicate.

#### Note

Humans use lights to communicate with each other to transfer information such as using traffic lights.



### Check your understanding

#### ► Choose the correct answer :

1. The chemical reaction inside firefly beetles allow them to .....
  - a. reflect the sunlight.
  - b. reflect the moon light.
  - c. produce their own light.
  - d. produce their own sound.
2. Firefly beetles use different flash patterns for .....
  - a. warning off from predators only.
  - b. attracting mates only.
  - c. warning off from predators and attracting mates.
  - d. warning off from mates and attracting predators.

- 3. Speaking is the only way to communicate with people. (Giza 2023) ( )
- 4. Echolocation is a type of communication between humans. ( )
- 5. Fireflies produce a chemical reaction inside their bodies that allows them to light up. ( )
- 6. A cell phone is a device that is used in communication between humans. ( )

#### 4 Complete the following sentences :

- 1. Fireflies use the sense of ..... to communicate with each other. (Cairo 2023)
- 2. Fireflies produce flash patterns to attract ..... to reproduce.
- 3. Fireflies communicate with each other by producing a ..... inside their bodies that makes them light up.
- 4. A group of fireflies can change their own ..... to match the flash pattern of another group to communicate.
- 5. Watching TV is a type of communication that use the senses of ..... and .....
- 6. Among the types of communication that are used by humans only are ..... and .....
- 7. The types of communication that are used by both animals and humans are ..... and .....

#### 5 Give reasons for :

- 1. Humans receive and send information through speaking, writing and reading.
- 2. Fireflies use different patterns of flash lights to communicate with each other.
- 3. Fireflies produce a chemical reaction inside their bodies.

#### 6 What happens if ... ?

A firefly wants to attract a mate to reproduce.

(Cairo 2023)

#### 7 Put (✓) in front of the way of communication used in each of the following items :

Items	Light	Sound	Both light and sound
1. Car lamps.			
2. Television.			
3. Traffic lights.			
4. Radio.			

# Exercises on Lesson 3

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. A firefly is not a bird, but it is a type of .....  
a. amphibians.      b. lizards.      c. beetles.      d. reptiles.
- 2. Which of the following is not a reason for fireflies to produce a flash light ? .....  
a. To attract a mate.      b. For communication.  
c. To warn off from predators.      d. To hear in the dark.
- 3. Changing the pattern of lighting up in a firefly is an example of ..... adaptation(s).  
a. structural and behavioral      b. physical and behavioral  
c. only structural      d. only behavioral
- 4. People can use the following ways to communicate, except .....  
a. reading.      b. writing.      c. speaking.      d. flying.
- 5. The ability to communicate through language and speech separates ..... from animals.  
a. humans      b. animals      c. plants      d. non living things
- 6. Reading and writing are common types of communication in ..... world.  
(Giza 2022 / Cairo 2023)  
a. humans      b. animals      c. birds      d. plants
- 7. Displaying light is a type of communication that is found in both .....  
a. plants and animals.      b. plants and humans.  
c. animals and humans.      d. plants and non living things.

## 2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Watching TV	a. is a type of communication in plants only.
2. Echolocation	b. is a type of communication in animals only.
3. Displaying light	c. is a type of communication in humans only. d. is a type of communication in both animals and humans.

1. ....

2. ....

3. ....

## 3 Put (✓) or (✗) :

- 1. Fireflies produce flash lights to warn off from predators. ( )
- 2. Fireflies are wingless beetles. ( )

**Examples :**

- **Thumbs-up or thumbs-down** : can express simple meanings like good and bad.
- **Traffic lights** : can express simple meaning like stop and go.



- **Expressions on faces** : are codes that can help people predict our feelings such as happy, sad, angry ... etc.



- **Language** : is a code in the form of sounds, where different languages are different codes that are used to transfer information.



- **Writing** : is a code that uses symbols in a pattern to give a specific meaning according to the arrangement of letters in a word.



- **Music or Sounds** : are different sound tones produced from humans or musical instruments can be used in communication.



- **Lighthouse** : sends codes in the form of flashes of light that tell sailors where they are.



**When sense organs receive this information and send messages to the brain, the brain decodes and interprets the meaning.**

**Check your understanding**

## ► Put (✓) or (✗) :

1. Ears and eyes send signals to the brain through nerves for processing and understanding. ( )
2. The code is a pattern that has meaning. ( )

**Review on Concept (1.3)**

To review this concept look at the **Assessment Book**  
**"Part 2 : Final Revision".**

**In the Assessment Book :**

Try to answer :

- Self-Assessment (13)
- Model Exam on Theme (1)

thumb  
express  
expressions  
predict

الأيام  
يعبر  
التعابرات  
يتنبأ / يتوقع

feelings  
instruments  
lighthouse  
decode

مشاعر  
الآلات / الأدوات  
فناار / منارة  
يحل شفرة

interpret  
sailors

يفسر  
البحارة

# LESSON FOUR

## Activity 8 Transferring Information

► Put (✓) or (✗) :

1. Fireflies communicate with each other through sounds. ( )
  2. Humans communicate with each other through language. ( )
- Sense organs collect information about the world around us then send signals to the brain through nerves for processing and understanding.
- Human senses are used to gather information from the environment and communicate with others, where :
1. Eyes detect light energy.
  2. Ears detect sound energy.

► Examples of information that the eyes receive :



- 1 Seeing the red traffic light means that you must stop.

- 2 People use a rescue flare to get help.



- 3 People use signal fires to communicate over distances of many kilometers.

- 4 Many hikers (travelers) use mirrors to attract the attention of rescue helicopters.

### Codes and transferring information :

- Humans use codes to transmit information.

Code :

It is a pattern that has meaning.

**4** Write the scientific term of each of the following :

- 1. Sense organ that can detect sound energy. (.....)
- 2. Sense organ that can detect light energy. (Giza 2022) (.....)
- 3. It sends flash codes that tell sailors where they are. (.....)

**5** Complete the following sentences :

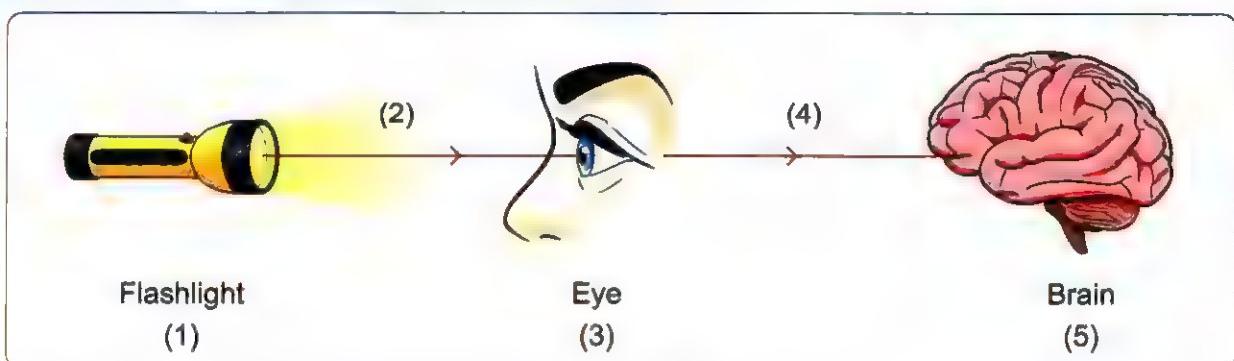
- 1. Humans can communicate with each other where ears of human detect ..... energy and eyes of human detect ..... energy.
- 2. Fireflies use ..... energy in their communication.
- 3. Music is codes that use the sense of ..... to communicate.
- 4. Writing is a way of coding that uses the sense of ..... to communicate.

**6** Give reasons for :

- 1. The symbols that are used in writing have a specific pattern.
- 2. People use face expressions during talking with each other.

**7** What happens if ... ?

- The traffic light becomes red while you are going to cross the road.

**8** Study the following figure , then put (✓) or (✗) ::

1. Number (5) represents the sense organ of light. ( )
2. Number (1) represents a source of light. ( )
3. Number (4) represents a special nerve through which the eye sends information to the brain for processing it. ( )
4. Number (2) represents a light ray that travels in straight line to enter the eye. ( )
5. Number (3) and (5) working together to collect and process different sounds. ( )

# Exercises on Lesson 4

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

1. All of the following are forms of codes, except ..... (Ismailia 2022)  
a. thumb up and down hands.      b. faces expressions.  
c. writing.                            d. swimming.
2. When your eyes see a red traffic light, this means that you have to .....  
a. increase your speed.      b. cross the street.  
c. keep your speed as it is.      d. stop at once.
3. People use a rescue flare to communicate with each other depending on the sense of .....  
a. hearing.      b. sight.      c. smell.      d. touch.
4. Sense organs collect information and send signals to ..... for processing and understanding. (Port Said 2022)  
a. hands      b. legs      c. brain      d. stomach
5. All the following signals are information that the eyes receive, except .....  
a. green traffic light.      b. fire alarm.  
c. signal fires.                    d. rescue flare.

## 2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Thumb-up	a. is a code that means that you are in a danger.
2. Thumb-down	b. is a code that means that you say "Yes". c. is a code that means that you say "No".

1. ....

2. ....

## 3 Put (✓) or (✗) :

1. Animals communicate with each other by using different senses. ( )
2. Sense organs can decode the information that is sent by the brain. ( )
3. Expressions on faces are codes that can help people predict our feelings. ( )
4. Different languages have similar codes. ( )
5. People use signal fires to communicate over distances of many kilometers. ( )

**3 (A) Complete the following sentences :**

(5 marks)

1. The ..... is the main control center in humans and animals bodies, while ..... are considered the organ of sight in their bodies.
2. Fishing cats depend on the sense of ..... in weak light levels, while in complete darkness they depend on the senses of ..... and .....
3. In the eyes of ..... animals, there is a mirror-like membrane that ..... light.
4. Paper and a piece of cloth are considered ..... surfaces that diffuse or scatter ..... energy.

**(B) Cross out the odd word :**

1. Fire – Candle – The moon. (.....)
2. Flashlight – The moon – Mirror. (.....)

# Model Exam 1

## on Concept (1.3)

**Total mark**

15

**1 (A) Choose the correct answer :**

(5 marks)

1. .... can communicate by displaying light.
    - a. All animals
    - b. All plants
    - c. All plants and animals
    - d. Humans and some animals
  2. Each of human and fishing cat, ....
    - a. has a mirror-like membrane in their eyes.
    - b. has an excellent night vision.
    - c. has two eyes adapted for vision.
    - d. becomes more active at night.
  3. Which of the following communications depends on the sense of sight only ? ....
    - a. Watching TV.
    - b. Flashing lights of fireflies.
    - c. Echolocation.
    - d. Using the cell phone.
  4. Painted surface ..... the incoming light rays.
    - a. absorbs only
    - b. reflects only
    - c. absorbs and reflects
    - d. allows to pass

**(B) Give a reason for the following :**

You can see an object placed behind a glass cup.

A) Put (✓) or (✗) :

### (5 marks)

1. Transparent objects don't allow light to pass through them. ( )
  2. Human has huge eyes like fishing cat to gather and reflect any light available. ( )
  3. Nocturnal animals have bigger eyes than humans. ( )
  4. Human can see in dim light as well as in bright light if his eyes contain a mirror-like membrane. ( )

### (B) What happens if ... ?

Light falls on a rough surface.

## THEME TWO : MATTER AND ENERGY

2

UNIT



MOTION

# Model Exam 2

2

## on Concept (1.3)

Total mark

15

### 1 (A) Choose the correct answer :

(5 marks)

1. The mirror-like membrane of the fishing cat is present .....  
a. inside the lungs.      b. at the back of the eye.  
c. inside the stomach.      d. at the back of the brain.
2. Light travels in ..... lines in the form of waves.  
a. circular      b. curved      c. zigzag      d. straight
3. Reading and writing are common types of communication in ..... world.  
a. plants      b. humans      c. animals      d. insects
4. Sense organs collect information and send signals to ..... for processing and understanding,  
a. legs      b. stomach      c. brain      d. hands

### (B) Give a reason for the following :

The fishing cat's eyes seem to glow in the dark.

.....

### 2 (A) Complete the following sentences :

(5 marks)

1. Human can see objects which give off their own light or objects which ..... light.
2. Rough materials reflect light ..... than smooth materials.
3. A group of firefly beetles can change their own ..... to match the flash pattern of another group to communicate.
4. Ears of humans detect ..... energy, while their eyes detect ..... energy.

### (B) What happens if ... ?

The mirror-like membrane in the fishing cat's eyes is not present.

.....

### 3 (A) Put (✓) or (✗) :

(5 marks)

1. Cats have excellent night vision, while humans are not. ( )
2. Mirror reflects most of incoming light rays that fall on it. ( )
3. Different languages have similar codes. ( )
4. A cell phone is a device that is used in communication between animals. ( )

### (B) Write the scientific term of each of the following :

1. Materials that allow light to pass through. (.....)
2. The sense organ of light (.....)

# Get Started

## What I Already Know

- All objects need energy to start or to stop motion.
- The opposite image shows a person in a wheelchair, where :
  - This person needs a small amount of force and energy to push the wheels of the chair to move down the ramp.
  - But, if this person needs to move up the ramp, so this person needs a larger amount of force and energy to push the wheels.



- In this unit, you are going to study :
  - How energy and motion are related.
  - How energy changes when a force affects an object.
  - The relationship between energy and work.
  - How to observe and calculate the speed of a moving object.
  - What happens when objects collide or crash together ?

- Unit project : Vehicle safety :
  - Cars have a lot of safety features to keep the driver and passengers safe during crashes such as seatbelts and airbags.
  - At the end of this unit, you are going to make a research project about one of the safety features in cars and create a plan to improve this safety features.



Concept

# 2.1

# Starting and Stopping





## Learning outcomes

**By the end of this concept, your child will be able to :**

- Explain and model what causes objects to change motion.
- Analyze data to explain different causes of changes in an object's motion.
- Cite evidence to show how speed is related to energy for an object.
- Model the cause and effect relationship between the force acting on an object and the object's motion.

## Key vocabulary

- |            |           |
|------------|-----------|
| • Energy   | • Gravity |
| • Force    | • Motion  |
| • Friction | • Work    |

## Notes For Parents On Concept [2.1]

<b>Lessons</b>	<b>Activities</b>	<b>What you should do with your child</b>
<b>1</b>	<b>Activity 1</b>	Discuss with your child some examples that need pushing or pulling forces.
	<b>Activity 2</b>	Explain to your child the meaning of the "jet engine" and also help him/her to read more about the "the Shockwave truck".
	<b>Activity 3</b>	Discuss with your child how the air provides force to move some objects.
<b>2</b>	<b>Activity 4</b>	Explain to your child the effect of balanced forces and unbalanced forces in our daily life.
	<b>Activity 5</b>	Discuss with your child the meaning of "gravity" and its effect on all objects on the Earth's surface.
	<b>Activity 6</b>	Explain to your child the meaning of "force" and its effect in our daily life.
<b>3</b>	<b>Activity 7</b>	Explain to your child the meaning of "friction force" and also let him/her mention some examples of friction force.
	<b>Activity 8</b>	Discuss with your child the relation between the amount of force acts on an object and the distance covered by this object.
<b>4</b>	<b>Activity 9</b>	Discuss with your child the relation between energy, work and force.
	<b>Activity 10</b>	Help your child to think like a scientist by answering a question about one of the main points of this concept, then write his/her claim, evidence and scientific explanation.

# LESSON ONE

## Activity 1

## Can You Explain ?



**Did you think about how each of the objects above start to move ?**

- The objects above require a **force** to stop or move.  
This force could be a pushing force or a pulling force.
- To move or to stop an object, the forces acting on this object must change.
- We need **energy** to apply these forces to the objects, where :
  - The person in picture 1 needs energy to **push** the car.
  - The person in picture 2 needs energy to **pull** the suitcase.
  - The football player in picture 3 needs energy to **push** the ball, while the goalkeeper needs energy to **push** against the ball to stop it.

► **In this concept, we will study :**

- How forces act on different objects to move or stop them.
- The meaning of force.
- The relationship between energy, work and force.

force  
goalkeeper  
acting on

قوة  
حارس مرمى  
يؤثر على

قوة الدفع  
ضد/عكس  
تنطلب

قوة السحب  
حقيبة سفر  
طاقة

## Activity 2 Truck Versus Airplane

► Look at the following pictures, then put (✓) or (✗) :

An airplane can move faster than  
a truck. ( )



Truck



Airplane

### Truck versus jet airplane :

In the pictures above, the engines on a jet airplane are much more powerful than the engine in a truck.

So, jet airplanes fly much faster than moving trucks.

### The Shockwave truck :

- The truck in the opposite picture is called "the Shockwave"
- The Shockwave truck contains three jet engines.



The Shockwave truck

### How does the Shockwave move ?

- The three jet engines make the Shockwave truck reach speeds more than 500 kilometers per hour.
- The Shockwave is about five times faster than the normal trucks.



### How does the Shockwave stop ?

- To stop the Shockwave, engineers install three parachutes in it, that the driver opens them to help slow down the Shockwave quickly.
- The idea of parachutes is used in rocket designs.



### Check your understanding

► Complete the following sentences using the words below :

**(faster than – slower than)**

1. The speed of a normal truck is ..... that of a jet airplane.
2. The speed of the Shockwave truck is ..... that of a normal truck.

## Activity 3 Making Things Move

► All objects around us cannot move without push and pull forces, where :



A ball lying on the ground does not move until someone **pushes** it with his foot to make the ball roll.

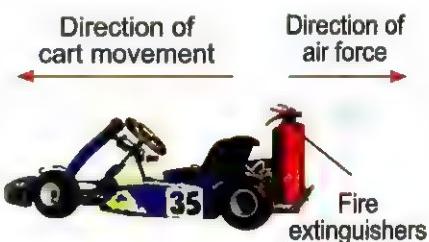


A closed drawer does not open until someone **pulls** the handle with his hand to open the drawer.

### ► Air force :

- Air can provide enough force to move some objects such as :  
The wind blowing that can move the leaves of a tree.
- Let's see how engineers prove that the force of air can move some objects like "a cart".

- Some engineers fix fire extinguishers onto a cart.
- When they release air from the fire extinguishers, the **air moves backward** that makes the **cart** begins to move **forward**.
- By **increasing** the number of fire extinguishers, the **speed** of the cart **increases** and the **distance** that it moves **increases** too and vice versa.



A cart with fire extinguishers



### Check your understanding

#### ► Put (✓) or (✗) :

1. Objects can move due to the effect of push or pull forces. ( )
2. Air has a force that can move some objects. ( )

In the Assessment Book :

Try to answer :  
Self-Assessment (14)

roll  
handle  
leaves

يدحرج  
مقبض  
أوراق الأشجار  
provide  
wind blowing  
fix

يمد  
هروب الريح  
يثبت  
fire extinguisher  
vice versa  
cart

طفارة حريق  
العكس صحيح  
عربة صغيرة  
release  
distance  
enough

إطلاق  
مسافة  
كاف

# Exercises on Lesson 1

● Understand

● Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. Push or pull actions are considered as types of ..... (Giza 2023/Alexandria 2022)  
a. force.      b. device.      c. energy.      d. adaptation.
  - 2. When you kick a ball, it moves due to the effect of .....  
a. pulling force only.      b. pushing force only.  
c. pushing and pulling forces.      d. sound energy only.
  - 3. When you move something away from you, this represents .....  
a. pushing force. b. light energy.      c. pulling force.      d. sound energy.
  - 4. When you move something toward you, this represents .....  
a. pushing force. b. light energy.      c. pulling force.      d. sound energy.
- (Cairo 2023/Cairo 2022)
- 5. The speed of a normal truck is more than that of .....  
a. a jet airplane only.      b. a jet airplane and a rocket.  
c. a rocket and a bicycle.      d. a bicycle only.
  - 6. Parachutes are used in the Shockwave truck to .....  
a. increase its speed.      b. decrease its speed.  
c. keep its speed as it is.      d. change its direction.
  - 7. In the Shockwave truck, the three jet engines, .....  
a. don't affect its speed.      b. decrease its speed.  
c. stop its motion.      d. increase its speed.
  - 8. By increasing the number of fire extinguishers fixed to a cart, its speed .....  
a. increases.      b. decreases.  
c. doesn't change.      d. becomes zero.
  - 9. All the following motions occur by the effect of pulling force, except .....  
a. kicking a ball.      b. opening a closed drawer.      (Cairo 2022)  
c. wearing your socks.      d. lifting up a bag from the ground.
  - 10. The ..... of the air that comes out of fire extinguishers causes the movement of a cart forward.  
a. pulling force      b. light energy      c. pushing force      d. sound energy

## 2 Put (✓) or (✗) :

- 1. To open or close a door, we have to push or pull it. ( )
- 2. Putting on a pair of socks needs a pushing force. ( )

- 3. You need energy to push a car forward or backward. ( )
- 4. A car can move faster than a bicycle. ( )
- 5. A normal truck can move faster than a jet airplane. ( )
- 6. The three jet engines in the Shockwave truck allow it to fly. ( )
- 7. A normal truck is slower than the Shockwave truck. ( )
- 8. Parachutes are used to slow down the speed of the Shockwave truck quickly. ( )
- 9. When the air is released backward from the fire extinguishers fixed to a cart, the cart moves backward. ( )
- 10. By decreasing the number of fire extinguishers fixed to a cart, the speed of the cart increases. ( )
- 11. Using a remote control of a television needs a pushing force to act on its buttons. ( )
- 12. By increasing the speed of a moving cart, the distance that it moves will decrease. ( )

### 3 Write the scientific term of each of the following :

- 1. A force that you make to move an object toward you. (.....)
- 2. A force that you make to move an object away from you. (Cairo 2023) (.....)
- 3. One of the fastest and most powerful trucks in the world. (.....)

### 4 Complete the following sentences :

- 1. The car can move or stop depending on the change of ..... acting on it.
- 2. To move anything from one place to another, you need to ..... it or ..... it.
- 3. In the Shockwave truck, engineers put three ..... in it to increase its speed, and they installed three ..... to stop it.
- 4. The idea of stopping the Shockwave truck is the same idea of stopping a moving .....
- 5. Engineers use ..... to slow down the motion of the ..... truck and rockets.
- 6. The wind can move small things like ..... of a tree, so engineers use this idea in moving a cart by fixing ..... onto it.
- 7. If we put more than one fire extinguisher to a cart, so the ..... of this cart will increase.

### 5 Give reasons for :

- 1. The Shockwave truck is faster than the normal truck.

- 2. Engineers use parachutes in the Shockwave truck designs.
- 3. When you kick a ball laying on the ground, it moves.

**6** What happens if ... ?

- 1. You kick a stopped ball on the ground.
- 2. Engineers placed jet engines inside a normal truck instead of its normal engine.
- 3. The Shockwave driver opens the parachutes.

**7** Look at the following pictures, then complete the following sentences :

Picture (1) : Normal truck



Picture (2) : Jet airplane

- The engine of picture (.....) is much powerful than the engine of picture (.....).
- When the engines of picture (.....) are placed in the picture (.....) it will turn into the Shockwave truck.
- The engines that are used in picture (.....) are the same engines that are used in the Shockwave truck.

**8** Look at the opposite figure, then answer the following questions :

- In the opposite figure what happens if we increase the number of fire extinguishers fixed to the cart.

## 2. Put (✓) or (✗) :

- 1. The air released by fire extinguishers moves backward, so the cart moves forward. ( )
- 2. When we decrease the number of fire extinguishers, the cart moves for a longer distance. ( )

# LESSON TWO

## Activity 4

### What Do You Already Know About Starting and Stopping ?

► Put (✓) or (✗) :

A ball will not move if you push it with your foot.

( )

## How do objects move ?

There are two forces that cause objects to move which are :

Pushing force	Pulling force
<p>Example :</p> <p>A man pushes a wheelbarrow.</p> 	<p>Example :</p> <p>A child pulls a toy car.</p> 

## The relation between motion with balanced and unbalanced forces :

Balanced forces	Unbalanced forces
<p>- If there are balanced forces act on an object, so this object will not move.</p> <p>Example :</p> <ul style="list-style-type: none"><li>- In the tug-of-war game, if the two teams are pulling the rope with equal forces.</li><li>- This means that, the forces that act on rope are balanced (equal) forces.</li><li>- So, the rope will not move.</li></ul> 	<p>- If there are unbalanced forces act on an object, so this object will move.</p> <p>Example :</p> <ul style="list-style-type: none"><li>- In the tug-of-war game, if one team is pulling the rope with a greater force.</li><li>- This means that, the forces that act on the rope are unbalanced (unequal) forces.</li><li>- So, the rope will move toward the team with the greater force.</li></ul> 

wheelbarrow  
balanced forces

عرة بدوية  
قوى متوافرة

قوى غير متوافرة  
شد الجبل

حبل  
فريق



### Check your understanding

► Put (✓) or (✗) :

1. If an object moves, it means that the forces acting on it are balanced. ( )
2. The unbalanced forces cause objects to move. ( )

► Complete the sentence below each picture, using the words "pushing" or "pulling" :



1. The player uses the ..... force to hit the ball.

2. The man uses the ..... force to move his suitcase.



3. Children use the ..... force in tug-of-war game.

4. The boy uses the ..... force to move his skating board.

## Activity 5 Objects in Motion

### How do we know an object is moving ?

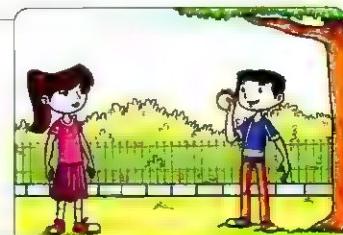
- An object is in motion if its position changes from one place to another, even if this change can't be seen.
- The change in position of an object is compared to something else that is not usually moving (fixed point).

#### Motion :

It is any change in the position of an object relative to a fixed starting point.

#### ► Example of an object motion :

The boy holding a ball in starting position which is close to the tree.



When he throws the ball, it will move by the pushing force through the air.



Then the ball will drop into the hand of the girl by the pulling force of gravity.

#### Gravity :

It is the force that pulls objects down toward the Earth.



- The ball will stop by the pushing force of the hand of the girl against the ball movement.
- The position of the ball changes, relative to the tree which is the fixed starting point.



motion  
relative to  
holding

حركة  
نسبة إلى  
إمساك

throw  
drop  
gravity

يُرمي  
يسقط  
الجاذبية

starting  
position  
close to

بداية  
مكان  
قرب من

toward  
fixed point

نحو  
نقطة ثابتة

• Some motion are easy to see, such as :

A person walking down the street.



Leaves move by the wind blowing.



• Some motion are hard to see, such as :

The rotation of the Earth around the Sun.



**Check your understanding**

► Complete the following sentences using the words below :

**(pull - position - force - motion)**

1. A ..... must act on a ball to start motion, so the ..... of the ball will change.
2. There are two types of force which are a push force and a ..... force that cause the ..... of any object.

## Activity 6 Force

### What makes objects move ?

Any object needs a **force** to move and change its position.

#### Force :

It is a push or pull that is applied to an object causes it to change its position.

#### ► What are the forces that affect the bag when you lift it ?

- The force of the gravity **pulls** your bag **downward**.
  - The force of your arm **pulls** your bag **upward**.
  - The pulling force of your arm is **greater** than the pulling force of the gravity (**two unbalanced forces**).
- So, the bag moves up toward the greater force.



#### Note

To move up any object from the ground, the pulling force of your arm must be **greater than** the pulling force of the gravity.

#### ► Is there any force affects objects when they are not in motion ?

##### 1. When you sit on a chair :

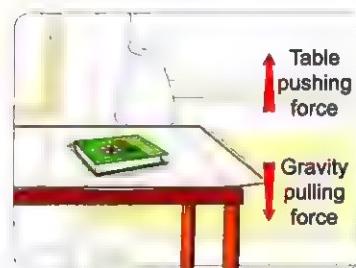
- The force of the gravity **pulls** you **downward**.
- The chair exerts force that **pushes** your body **upward**.
- The pulling force of the gravity is **equal** to the pushing force of the chair (**two balanced forces**).



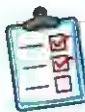
So, there is **no motion** due to the two balanced forces that hold you in the chair.

##### 2. When a book is put on a table :

- The force of the gravity **pulls** the book **downward**.
- The table exerts force that **pushes** the book **upward**.
- The pulling force of the gravity is **equal** to the pushing force of the table (**two balanced forces**).

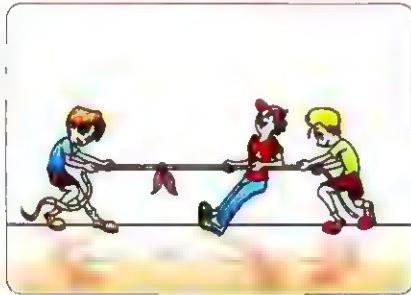


So, there is **no motion** due to the two balanced forces that affect the book.

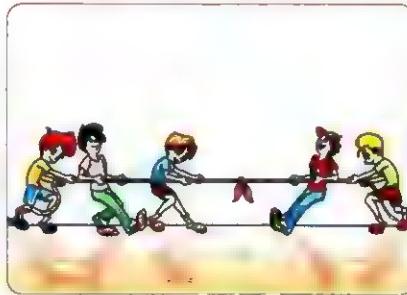


## Check your understanding

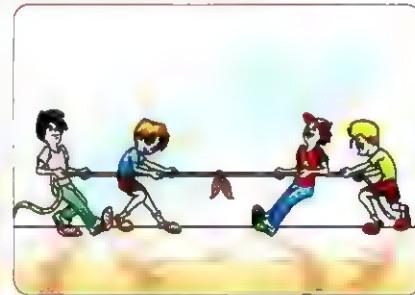
► Look at the following pictures, then answer the questions below :



Picture (1)



Picture (2)



Picture (3)

**1. Choose :**

In this game when the rope moves, it moves toward the team with ..... force (greater – smaller).

**2. Complete the sentences by writing if the forces are "balanced" or "unbalanced" :**

- The forces in picture (1) are .....
- The forces in picture (2) are .....
- The forces in picture (3) are .....

In the Assessment Book :

Try to answer :  
Self-Assessment (15)

# Exercises on Lesson 2

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. All objects around us can move by the effect of .....  
a. pushing force only.      b. pulling force only.  
c. pushing and pulling forces.      d. sound and light energies.
- 2. A ball may move away from the foot of a football player by the effect of .....  
a. pushing force only.      b. pulling force only.  
c. pushing and pulling forces.      d. sound energy only.
- 3. When an object is in motion, this means that its ..... changes. (Cairo 2023 / Cairo 2022)  
a. color      b. shape      c. size      d. position
- 4. When you sit on a chair, the force of gravity is ..... and holding you in the chair.  
a. pulling you upward.      b. pulling you downward.  
c. pushing you upward.      d. pushing you downward. (Cairo 2022)
- 5. What makes a ball in the air fall down to the ground ? .....  
a. Friction force.      b. Gravity force.  
c. Sound energy.      d. Light energy.
- 6. Which of the following will cause an object to move ? .....  
a. Balanced forces.      b. Unbalanced forces.  
c. Sound energy.      d. Light energy. (Luxor 2022)
- 7. In the tug-of-war game, two teams .....  
a. pull the rope in the same direction.  
b. push the rope in the same direction.  
c. pull the rope in opposite directions.  
d. push the rope in opposite directions.
- 8. In the tug-of-war game, when two teams are pulling a rope, and the rope does not move toward any team, this means that .....  
a. equal forces are being applied on the rope in the same direction.  
b. equal forces are being applied on the rope in opposite directions.  
c. unequal forces are being applied on the rope in the same direction.  
d. unequal forces are being applied on the rope in opposite directions.

9. Which of the following is an example of unbalanced forces ? .....
- Two children push a box with the same force in opposite directions.
  - Two children play on a seesaw without its moving up or down.
  - Two children play on a seesaw, that moves up and down.
  - Two teams play the tug-of-war game while the rope doesn't move.
10. All of the following are examples of motion, except .....
- |                      |                                       |
|----------------------|---------------------------------------|
| a. a running person. | b. a ball travelling through the air. |
| c. a flying bird.    | d. a sleeping dog.                    |
11. Two equal forces act at the same time on a stopping object but in opposite directions. Which sentence describes the object's state ? .....
- The object stays in its place without moving.
  - The object speed decreases.
  - The object speed doesn't change.
  - The object speed increases.
12. You can see the movement of the following objects, except the movement of ..... (Giza 2023)
- |                       |                      |
|-----------------------|----------------------|
| a. a flying airplane. | b. a running horse.  |
| c. sea waves.         | d. the planet Earth. |
13. Gravity is a force that ..... (Kafr El-Sheikh 2022)
- pushes objects down toward the Earth.
  - pulls objects down toward the Earth.
  - pushes objects toward the sky.
  - pulls objects toward the sky.

**2 Put (✓) or (✗) :**

- 1. The stopping object can't move until a force acts on it. (Cairo 2023 Minia 2022) ( )
- 2. The rotation of the Earth around the Sun is easy to be seen. ( )
- 3. Unbalanced forces keep an object in its place without moving. ( )
- 4. If the two teams in the tug-of-war game are pulling the rope with equal forces, the rope will move toward one of the two teams. ( )
- 5. Unbalanced forces cause a change in the object position. (Minia 2023) ( )
- 6. If one team in the tug-of-war game pulls the rope with a greater force, the rope will move toward the team with the smaller force. ( )

**3 Write the scientific term of each of the following :**

- 1. It is a push or pull that is applied to an object causes it to change its position. (Cairo 2022) (.....)

- 2. The force you can do to move an object away from you. (.....)
- 3. The force you can do to bring an object closer to you. (.....)
- 4. A change in the position of an object relative to a fixed starting point. (.....)
- 5. The force that pulls objects down toward the Earth. (.....)

#### 4 Complete the following sentences :

- 1. As you are sitting down on a chair, there are two forces that act on your body which are the ..... force of gravity and the ..... force of the chair.
- 2. The toy placed on a table does not move due to the effect of the two balanced ..... acting on it.
- 3. In the tug-of-war game, the ..... force of the stronger team makes the rope moves toward this team.
- 4. When you throw a ball up in the air, it starts to fall down again toward the ground due to the effect of pulling force of .....
- 5. When you lift up an object from the ground, there are two forces act on it, which are the ..... force of your hand and ..... force of the gravity.
- 6. You can stop a moving basketball by the ..... force of your hand against the ball movement.
- 7. The train's position changes relative to the train station. This sentence describes the meaning of .....
- 8. A chair stands on the floor due to the pulling force of .....
- 9. If you throw a ball through the air, it is affected by the ..... force of your hand and the ..... force of the Earth's gravity.
- 10. We can say that the object is in motion when it changes its position relative to a ..... starting point.

#### 5 Correct the underlined words :

- 1. Moving an object away from you represents a pulling force. (.....)
- 2. Moving an object toward you represents a pushing force. (.....)
- 3. The balanced forces cause the object to move. (Gza 2023 / Gharbia 2023) (.....)
- 4. When you jump up, the force of friction pulls you back to the ground. (.....)
- 5. Changing the position of an object relative to a fixed point is known as force. (.....)
- 6. The rope in the tug-of-war game may not move toward any team, if both teams push with the same force. (.....)

**6** Give reasons for :

- 1. When two equal pushing forces act on an object in opposite directions, the object doesn't move.
- .....  
.....

- 2. If you let a pen out of your hand, it falls to the ground.
- .....  
.....

- 3. When your friend catches a ball that is thrown in the air, the motion of the ball is stopped.
- .....  
.....

**7** What happens if ... ?

- 1. The pulling forces of the two teams are equal in the tug-of-war game.
- .....  
.....

- 2. You let your toy out of your hand.
- .....  
.....

**8** Look at the following pictures, then choose if the forces are "Balanced" or "Unbalanced" :

1. A book on a table  
(Balanced – Unbalanced)



2. A seesaw  
(Balanced – Unbalanced)

**9** Write the type of force that is used in each of the following situations :



1. ....



2. ....



3. ....



4. ....

**10** Look at the following picture, then choose the correct answer :



1. Among the forces that act on the basketball in this picture are .....
  - a. pushing force of both gravity and the player's hand.
  - b. pulling force of both gravity and the player's hand.
  - c. pushing force of gravity and pulling force of the player's hand.
  - d. pulling force of gravity and pushing force of the player's hand.
  
2. The basketball will fall down to the ground due to the ..... that acts on it.
 

a. pushing force of gravity	b. pulling force of gravity
c. friction force of air	d. friction force of ground

# LESSON THREE

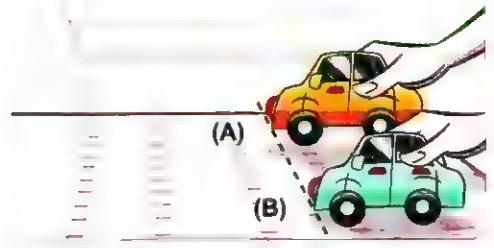
## Activity 7 | Stopping Motion

► Look at the opposite figure, then choose the correct answer :

- If we roll the two cars with two different forces, where car (B) is pushed with a force greater than car (A).

Which car travels a farther distance ? .....

[ Car (A) – Car (B) ]



### How does an object in motion stop ?

A moving object only stops when a force of the **same amount** is applied to it in the **opposite direction** of its motion.

- The force that stops a moving object may be :

Easy to be observed	Hard to be observed
<p><b>Example :</b></p> <ul style="list-style-type: none"> <li>When a car crashes into a wall, it will stop.</li> <li>Because the wall applied a force to the car with the same amount of the force that pushes the car toward the wall.</li> </ul> 	<p><b>Example :</b></p> <ul style="list-style-type: none"> <li>When a car runs out of fuel on a flat road, its speed decreases gradually until it stops.</li> <li>Because there is a <b>friction</b> force comes from :             <ol style="list-style-type: none"> <li>Friction (rub) between the car tires and the road.</li> <li>Friction between the air that flows over the car against its surface.</li> </ol>  </li> </ul>

observe  
crash  
run out

بالخط  
يصطدم  
يهدى / ينتهي

further  
fuel  
gradually

بعد  
الوقود  
تدريجياً

friction  
tires  
rub

احتكاك  
إطارات السيارة  
فرك

amount  
opposite  
direction

كمية  
عكس  
اتجاه

## Friction :

It is a force that is exerted when objects rub against each other.

### 💡 Notes

1. Friction force always slows down or stops motion of moving objects.
2. The direction of friction force is always **opposite** to the direction of motion of a moving object.



### Check your understanding

► Complete the following sentences using the words below :

**(friction - opposes - unbalanced)**

1. Any object moves from its place when the forces acting on it are .....
2. The force that slows down or stops motion is called .....
3. Friction is a force that ..... the motion direction.

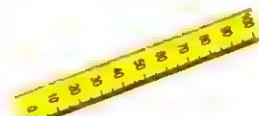
## Activity 8 Rolling Cars

- You have learned about the causes of motion, in this activity you will explore the effect of applying different amounts of force to an object.

### ► Tools



Toy car



Measuring ruler

### ► Steps

- Push a toy car hard from a starting point, and record the distance the toy car rolls by using the measuring ruler.
- Repeat the above step several times, and record the data in a table, then find the average distance.
- Push a toy car very gently from the same starting point, and record the distance the toy car rolls.
- Repeat step (3) several times, and record the data in another table, then find the average distance.



### ► Observations

- The car moves a **large** distance when it is pushed **hard** as shown in the following table :

Hard push	
Trial	Distance (cm)
1	90 cm
2	75 cm
3	80 cm
4	95 cm

**The average distance =**  

$$\frac{90 + 75 + 80 + 95}{4} = 85 \text{ cm}$$

- The car moves a **small** distance when it is pushed **gently** as shown in the following table :

Gentle push	
Trial	Distance (cm)
1	14 cm
2	17 cm
3	20 cm
4	17 cm

**The average distance =**  

$$\frac{14 + 17 + 20 + 17}{4} = 17 \text{ cm}$$

explore  
several times  
repeat  
average distance

يكتشف  
عنة مرات  
عادة  
متوسط المسافة

بلطف / برقة  
التجربة  
دفعه قوية  
gentle push  
data  
record

دفعة خفيفة  
بيانات  
يسجل

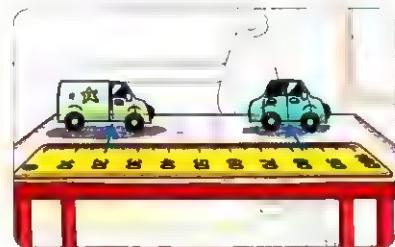
## ► Conclusions

- Hard push causes object to travel a long distance.
- Gentle push causes object to travel a small distance.

### 💡 Note

If the same force acts on a toy car and a toy truck :

- The car (the smaller object) will travel a farther distance.
- The truck (the bigger object) will travel a shorter distance.



## Check your understanding

### ► Put (✓) or (✗) :

1. A toy car travels a very small distance when it is pushed hard. ( )
2. When we push a toy car and a toy truck with the same force, the toy car will move faster. ( )

In the Assessment Book :

Try to answer :

Self-Assessment (16)

# Exercises on Lesson 3

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. The force that occurs when an object rubs against another object is called .....  
a. friction.      b. gravity.      c. push.      d. pull.      (*Minia 2022*)
- 2. The force that tries to stop an object moving on a surface is called .....  
a. gravity.      b. friction.      c. push.      d. pull.
- 3. There is a ..... force between the car tires and the road that acts to decrease car's speed gradually.      (*Cairo 2023 / Dakahlia 2022*)  
a. gravity      b. pulling  
c. pushing      d. friction
- 4. Which of the following sentences describes the friction force ? .....  
a. It pulls objects toward the ground.  
b. It pushes objects away from the ground.  
c. It slows down or stops objects in motion.  
d. It doesn't affect objects in motion.
- 5. When an apple falls from a tree down to the ground, it is affected by .....  
a. friction force of air only.  
b. gravity pulling force only.  
c. gravity pushing force only.  
d. friction of air and gravity pulling forces.
- 6. Tamer pushes a ball on a flat ground and it covers a distance of 30 cm. If he pushes it with more force, it may cover a distance equal to ..... cm.  
a. 5      b. 15      c. 30      d. 50

## 2 Put (✓) or (✗) :

- 1. When a car crashes into a wall, it will not stop.      (*Alexandria 2023*) ( )
- 2. Sometimes it is easy to observe the force that stops an object.      ( )
- 3. When a car runs out of fuel on a flat road, its speed increases gradually until it stops.      (*Sharkia 2023*) ( )
- 4. Friction force always slows down or stops the motion of moving objects. ( )
- 5. The motion of an object on the ground is affected by a friction force. ( )
- 6. Hard push causes an object to travel for a longer distance. ( )
- 7. If the same force acts on two different objects so, the bigger object will travel for a longer distance. ( )
- 8. A football rolls on the ground to a distance then it stops. The force which stops the ball is the gravity force. ( )

**3** Correct the underlined words :

1. Moving object stops when a force of the same amount is applied to it in the same direction of its motion. (.....)
2. If a car runs out of fuel, its speed increases. (.....)
3. The motion of a car is opposed by the gravity of air. (.....)

**4** Write the scientific term of each of the following :

- 1. It is a force that is exerted when objects rub against each other. (.....)
- 2. It is a force that slows down the motion of moving objects. (.....)

**5** Complete the following sentences :

- 1. A moving car is affected by the ..... force of both air and road which act in the ..... direction of the car movement.
- 2. We can say that a train is faster than a car if the ..... acting on the train is ..... than that acting on the car to move the same distance.
- 3. If you push each of a small ball and a big ball with the same force, the small ball moves a distance ..... than the big ball.
- 4. In tug-of-war game, the rope moves toward the group which has pulling force ..... than the other group.
- 5. The speed of a ball moving on the ground decreases gradually until it stops due to the effect of ..... force.
- 6. When you kick a ball hard, it will move for a ..... distance but when you kick the same ball gently, it will move for a ..... distance.
- 7. If the same pulling force acts on two boxes of different sizes, the smaller box will move for a ..... distance.

**6** Give reasons for :

1. When your toy car crashes into a wall, it will stop moving.
- .....
- .....

2. When you stop pedalling during the movement of your bicycle, it slows down until it stops.
- .....
- .....

3. If you push two similar toy cars on the same ground, one of them may travel for a longer distance than the other.
- .....

4. If the same force acts on a small car and a truck, the small car will travel for a longer distance than the truck.
- .....

**7** What happens if ... ?

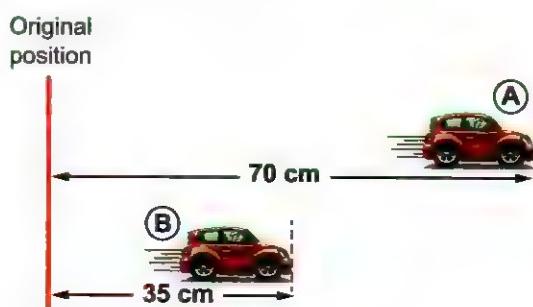
1. A car runs out of fuel on a flat road.
- .....  
.....  
.....

2. You push two similar balls with different forces on the ground.
- .....  
.....  
.....

**8** The following figure shows two similar toy cars are pushed to move on the same floor, study the figure then answer the questions below :

1. Which of these two cars is affected by a greater force ?  
 (Give a reason for your answer).
- .....  
.....  
.....

(Cairo 2022)

**2. Choose the correct answer :**

1. If the two cars were pushed by the same force, so .....
  - a. car (A) would move for a longer distance than car (B).
  - b. car (B) would move for a longer distance than car (A).
  - c. the two cars would move the same distance.
  - d. the two cars would not move.
  
2. If you replace car (A) with a new car which is larger than car (B), the new car will move a distance ..... the distance that covered by car (B).
 

a. longer than	b. shorter than
c. equal to	d. twice
  
3. The two cars during motion are affected by all the following forces, except .....
 

a. the pushing force.	b. the friction force of the air.
c. the friction force of the floor.	d. the pushing gravity force.

# LESSON FOUR

## Activity 9 Energy, Work and Force

- Look at the opposite picture, then choose the correct answer:

This man exerts a ..... force on the car to make it moves.

( pushing – pulling )



### The relationship between energy, work and force :

► Example :

- The man exerts a pushing **force** on the car to move it.
- So, this force transfers **energy** from his body to the car.
- When he moves the car, this means that he is doing **work**.



► From the previous example, we can conclude that :

- Force transfers energy from one object to another.
- The work done is equal to the amount of energy transferred by a force that is used to move an object.



**Note**

Force and energy are different, but they are related to one another, where force is the effect that changes energy and allows it to do work.



### Check your understanding

► Complete the following sentences using the words below :  
(force - work)

1. To make an object start or stop moving, this requires .....
2. When you push a car and it starts to move, you are doing .....

relationship  
work

صلة flat road  
شحل transfer

طريق مسطح enable us  
ينقل / يتحول related to

نوكنا  
متعلق بـ 189

## Activity 10 Record Evidence Like A Scientist

- In this concept, you have learned a lot about the role of balanced and unbalanced forces in starting and stopping motion.
- Now**, try to think like a scientist by writing your claim, your evidence and your scientific explanation about one of the main points of this concept through the four steps you have learned in the previous concepts.

### Step 1 The Question

How do forces act on different objects to make them start moving and stop moving ?

### Step 2 My Claim

.....  
.....  
.....

### Step 3 My Evidence

.....  
.....  
.....  
.....

### Step 4 My Scientific Explanation

.....  
.....  
.....  
.....  
.....

#### Review on Concept (2.1)

To review this concept look at the **Assessment Book**  
**"Part 2 : Final Revision".**

In the Assessment Book :

Try to answer :

- Self-Assessment (17)
- Model Exam on Concept (2.1)

# Exercises on Lesson 4

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. All of the following examples can move by a pushing force, except .....  
a. a ball.      b. a swing.      c. tug-of-war rope.      d. a car.
- 2. To stop a moving object we can apply a ..... against it.  
a. pushing force    b. gravity force    c. sound energy    d. light energy
- 3. Samir pushed his toy car that moved forward, to stop it he should .....  
a. push it in the same moving direction.  
b. pull it with a small force in the same moving direction.  
c. pull it with a large force in the same moving direction.  
d. push it in a direction opposite to its moving direction.
- 4. The work done is equal to the amount of ..... transferred by a force that is used to move an object.  
a. energy      b. friction      c. pushing      d. gravity

## 2 Put (✓) or (✗) :

- 1. If a person moves a table through a distance, there is a work done. ( )
- 2. Lifting a book upward needs more energy than pushing a truck. ( )
- 3. If you try to open a door but you cannot open it, this means that work is done. ( )
- 4. Hitting a tennis ball needs a pulling force. (Giza 2023) ( )

## 3 Complete the following sentences :

- 1. When you push a table to move on the floor, your pushing force transfers ..... from your body to the table.
- 2. Any force applied to an object is considered as the effect that changes ..... and allows it to do ..... done by this object.
- 3. The work done on a basketball is equal to the amount of ..... transferred from the player hand to the ball.
- 4. To stop the rolling ball on the ground, you need to exert a ..... equal to that exerted by the ball in the opposite direction.

## 4 In the opposite figure, which of the two players does

- more work to raise the weights ?  
(Give a reason for your answer ).



# Model Exam 1

1

## on Concept (2.1)

Total mark

15

### 1 (A) Choose the correct answer :

(5 marks)

1. Mona throws her ball up in the air so, gravity will make the ball move .....  
a. forward.      b. upward.      c. downward.      d. backward.
2. Which situation represents the best example of gravity ? .....  
a. A car hits a tree and its motion stops.  
b. A wind blows and a sailboat moves.  
c. A book is pushed to move across a table.  
d. A person drops a ball that falls to the ground.
3. The speed of the Shockwave truck is more than that of the .....  
a. normal truck only.      b. jet airplane only.  
c. normal truck and rocket.      d. rocket and jet airplane.
4. All the following are examples of pushing force, except .....  
a. writing using a keyboard.      b. lifting a bag.  
c. kicking a ball.      d. throwing a basketball.

### (B) What happens if ... ?

The forces that are acting on the rope of tug-of-war game are balanced.

(according to the movement of the rope).

### 2 (A) Put (✓) or (✗) :

(5 marks)

1. Gravity pulls objects upward. ( )
2. The main difference between pulling and pushing forces is the direction of the force. ( )
3. We can't observe the movement of a person walking on the street. ( )
4. If you move a chair through a distance, there is work done. ( )

### (B) Give a reason for the following :

If you push a pen on the table, it moves for a certain distance till it stops.

**3 (A) Correct the underlined words :**

(5 marks)

1. By increasing the pushing force acting on a moving toy car, it will move for a short distance. (.....)
2. Any moving object stops when a force of the same amount is applied on it in the same direction of its movement. (.....)
3. To increase the speed of the Shockwave truck, engineers installed three parachutes in it. (.....)
4. A table stays without any motion due to the unbalanced forces that are acting on it. (.....)

**(B) Look at the opposite picture, then complete the following sentences :**

1. The person in this picture uses ..... to land safely.
2. The idea of person landing in this picture is the same as the idea of stopping the motion of ..... and .....



# Model Exam 2

2

## on Concept (2.1)

Total mark

15

### 1 (A) Complete the following sentences :

(5 marks)

- When we put a jet engine in a normal truck, its speed will .....
- The bicycle cannot move without a ..... acting on it.
- When you push a toy car on the ground, its speed decreases gradually until it stops due to the effect of ..... force.
- To stop a moving toy truck on the ground, you need to exert a ..... equal to that exerted by the toy truck in the opposite direction.

### (B) Give a reason for the following :

If a ball moves on the flat road, its speed decreases till it stops.

.....

.....

### 2 (A) Write the scientific term of each of the following :

(5 marks)

- The type of force that is used in tug-of-war game. (.....)
- It is the force that causes any object falls down toward the ground. (.....)
- It is the engine that is used in the Shockwave truck to allow it moves fast. (.....)
- It is a force that is exerted when objects rub against each other. (.....)

### (B) What happens if ... ?

A car and a truck are affected by the same pushing force.

.....

.....

### 3 (A) Choose from column (B) what suits it in column (A) :

(5 marks)

(A)	(B)
1. Friction force	a. are the forces that act on any object to make it moves.
2. Balanced forces	b. is the force that act in the opposite direction of the object's movement to stop it.
3. Unbalanced forces	c. is the force that causes any object falls down toward the ground.
4. Gravity force	d. are the forces that act on any object that does not move.
	e. is the force that act in the same direction of the object's movement to stop it.

1. ....

2. ....

3. ....

4. ....

(B) Look at the opposite picture that shows a boy moves a car forward, then complete the following sentences :

1. The car moves as a result of ..... force that is applied by the boy.
2. During the movement of the car, it is opposed by the friction force of ..... and the friction force of the ground.



# 2.2

## Energy and Motion





## Learning outcomes

**By the end of this concept,  
your child will be able to :**

- Investigate the forms of energy in a system or for an object.
- Apply logical reasoning to predict the types of energy for an object.
- Cite evidence to explain how energy is conserved.

## Key vocabulary

- Kinetic energy
- Potential energy
- Chemical energy
- Gravitational potential energy
- Thermal energy

## Notes For Parents On Concept [2.2]

<b>Lessons</b>	<b>Activities</b>	<b>What you should do with your child</b>
<b>1</b>	<b>Activity 1</b>	Let your child mention some examples of objects that have kinetic energy and potential energy.
	<b>Activity 2</b>	Discuss with your child the different types of energy in the roller coaster during its movement.
	<b>Activity 3</b>	Discuss with your child the different forms of energy and let him/her mention some examples of each of them.
<b>2</b>	<b>Activity 4</b>	Explain to your child the relationship between energy and work.
	<b>Activity 5</b>	Explain to your child the meaning of "potential energy" and "kinetic energy".
<b>3</b>	<b>Activity 6</b>	<ul style="list-style-type: none"> <li>- Explain to your child that all forms of energy are classified into two main groups which are potential energy and kinetic energy.</li> <li>- Discuss with your child that potential energy depends on the mass of an object and its height from the Earth's surface.</li> </ul>
	<b>Activity 7</b>	Let your child mention the changes of energy in some devices.
<b>4</b>	<b>Activity 8</b>	Explain to your child the concept of : "energy is not created or destroyed".
	<b>Activity 9</b>	Help your child to think like a scientist by answering a question about one of the main points of this concept, then write his/her claim, evidence and scientific explanation.

# LESSON ONE

## Activity 1 Can You Explain ?



A player kicks a ball



Running down a sand hill

Figure 1



A toy car on a slope

Figure 2

Figure 3

► In the previous concept, you have learned that :

Objects need a force to move or stop and this force applied on objects needs energy to be able to do work, so how do moving objects get energy ?

• The pictures above show :

- A sand surfer moves very fast down the sand hill in figure 1.
- The ball moves through the air when the player kicks it with his foot in figure 2.
- The toy car at the top of slope will not move if no force is applied on it in figure 3.

► From the previous observations, we can conclude that :

- All moving objects have a type of energy known as **kinetic energy**.
- Objects that do not move don't have kinetic energy but they have another type of energy known as **potential energy** that is stored in them. When these objects start to move, they get kinetic energy.

► In this concept, we will study :

- The meaning of energy and its basics.
- Kinetic energy and potential energy.
- Types of energy.

hill  
slope

force  
energy

فُوْتَهُ  
طاقة

sand surfer  
kinetic energy

مُنْزِلَجٌ عَلَى الرَّمَالِ  
طاقة حركة

طاقة وضع

**Activity 2** | Roller Coasters

In your opinion, which of the following energies is responsible for the movement of the roller coaster (train) ?

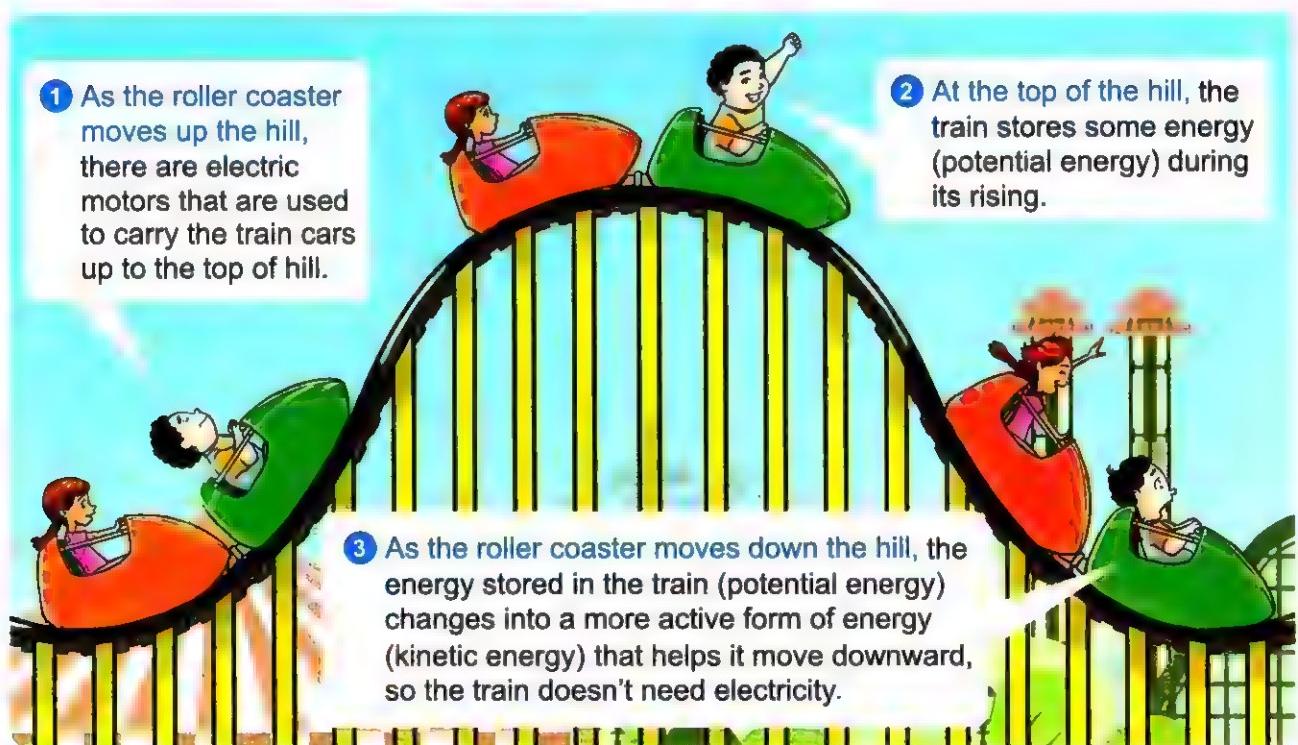
- a. Kinetic energy.
- b. Sound energy.
- c. Light energy.
- d. Thermal energy.



► In the previous activity, you have learned that objects need energy to move. Now, let's study the motion of the "roller coaster" as an example to know the source of energy that makes it move.

- First, the roller coaster moves up the hill (ramp) slowly and its speed decreases gradually until it reaches the highest point.
- Then, the roller coaster pauses briefly at the top of the hill.
- After that, the speed of the roller coaster increases as it moves down the hill.

► To know the source of energy that makes the train move with this speed, read the following steps :



### Note

While the roller coaster moves down the hill, the kinetic energy increases as its speed increases.

► From the previous explanation, we can conclude that :

- When the roller coaster moves downward, its kinetic energy increases.
- The kinetic energy increases as the speed increases.

### What happens if ... ?

- A roller coaster moves from up to down. (according to its energy).  
The stored potential energy in the train is changed into kinetic energy.
- A roller coaster stops. (according to its kinetic energy).  
Its kinetic energy becomes zero.



### Check your understanding

► Put (✓) or (✗) :

1. Kinetic energy of a moving object increases as its speed increases. ( )
2. When a roller coaster moves from up to down, it has the most kinetic energy when it reaches the lowest point of the hill. ( )
3. When the roller coaster moves downward, its kinetic energy decreases. ( )

**Activity 3****What Do You Already Know About Energy and Motion ?**

- From the previous activities, you can conclude that we need energy to do all our daily activities such as running, walking and even during reading a book. So, energy is part of everything that happens in the world and everything we do.
- Examples show the importance of energy in our life :

1

We eat food to obtain energy to help us grow and move.



2

Energy affects objects and makes them move and change their places.



3

Energy helps in operating all electric devices.



4

Energy helps in cooking.



5

Energy helps in lighting houses and streets.



## Moving Energy :

- Energy moves (transfers) from an object to another as in the example below that shows a player kicks a ball as shown in the following steps :

**1** The kinetic energy transfers from the player's foot to the ball when he kicks it.



**2** Then, the ball moves in the air as a result of the transfer of kinetic energy to it.



**3** Then, the kinetic energy transfers from the ball to the goal net which vibrates as a result of the transfer of kinetic energy to it.



### Note

Any stopped object on the Earth's surface as in figure (1) has no energy. Any object at a height from the Earth's surface as in figure (2) has a special type of energy known as potential energy.



Figure (1)

Figure (2)



### Check your understanding

#### ► Put (✓) or (✗) :

1. Energy affects objects and makes them move and change their places. (      )
2. Energy doesn't transfer from an object to another. (      )

In the Assessment Book :

Try to answer :

Self-Assessment (18)

# Exercises on Lesson 1

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. When a sand surfer moves down the hill, this means that he has ......., due to his movement.
  - a. kinetic energy
  - b. stored light energy
  - c. potential energy
  - d. stored electrical energy
- 2. Human needs ..... to walk from one place to another.
  - a. light energy
  - b. energy obtained from food
  - c. sound energy
  - d. energy obtained from batteries
- 3. Electric motor in the roller coaster helps it to ......
  - a. move up to the top of the hill.
  - b. move down to the bottom of the hill.
  - c. stop at the top of the hill.
  - d. stop at the bottom of the hill.
- 4. When an object moves down a ramp, its stored potential energy ......
  - a. increases.
  - b. doesn't change.
  - c. changes to a less active form of energy.
  - d. changes to a more active form of energy.
- 5. When the roller coaster goes up, its speed ......
  - a. decreases as it goes down.
  - b. decreases as it reaches the top of the hill.
  - c. is more than its speed when it goes down.
  - d. increases as it reaches the top of the hill.
- 6. When a wheelchair and a car go up a ramp, which of them can store some energy ? ....
  - a. The wheelchair only.
  - b. The car only.
  - c. Both of them.
  - d. None of them.
- 7. The roller coaster has the most energy of motion, ......
  - a. as it goes up to the top of the hill.
  - b. as it goes down the hill.
  - c. when it stops at the top of the hill.
  - d. when it stops at the bottom of the hill.
- 8. When the roller coaster stops, its energy of motion ......
  - a. doesn't change.
  - b. increases.
  - c. decreases.
  - d. becomes zero.

- 9. When a car moves up a ramp, this happens due to the effect of .....
  - a. gravity force.
  - b. balanced force.
  - c. kinetic energy.
  - d. sound energy.
  
- 10. The type of energy that allows objects to move is known as .....
  - a. light energy.
  - b. potential energy.
  - c. solar energy.
  - d. kinetic energy.

**2** Choose from column (B) what suits it in column (A) :

(A)	(B)
1. When a wheelchair goes down a ramp,	a. it is under the effect of balanced force, and it doesn't store energy.
2. When a wheelchair stops at the top of a ramp,	b. it has only energy of motion.
3. When a wheelchair stops at the bottom of a ramp,	c. it is under the effect of unbalanced force, where it loses its stored energy. d. it is under the effect of balanced force, and it stores energy.

1. ....

2. ....

3. ....

**3** Put (✓) or (✗) :

- 1. We eat food to obtain energy. ( )
- 2. Energy doesn't transfer from an object to another. ( )
- 3. When a stopped object is affected by two opposite equal forces, it will not move. ( )
- 4. If a wheelchair moves horizontally on the ground, its energy of motion equals zero. ( )
- 5. The moving objects only have energy, while the objects that don't move have no energy. (Giza 2022) ( )

**4** Write the scientific term of each of the following :

- 1. The form of energy that the object has due to its movement. (.....)
- 2. The form of energy that increases when the speed of an object increases. (Sohag 2022) (.....)

**5** Correct the underlined words :

- 1. When a roller coaster moves down a ramp, its kinetic energy doesn't change. (.....)

2. If you push a pencil upward, it stops at a certain height then falls down due to the effect of pushing force of gravity. (.....)
3. When an object moves down, it has an active form of energy known as potential energy. (.....)
4. Under the effect of pushing force of gravity, anything falls down to the ground. (.....)
5. Balanced forces cause stopped objects to move. (.....)
6. Your potential energy is transferred from your foot to a ball when you kick it. (.....)

### 6 Complete the following sentences :

- 1. When the roller coaster starts to move, it gets energy from ..... found in its first car which is operated by .....
- 2. The speed of a roller coaster when it moves toward the top of the hill is ..... than that when it moves down the hill.
- 3. If the speed of an object decreases, this means that its kinetic energy .....
- 4. When the roller coaster moves up to the top of the hill, ..... and ..... energies cause its motion.
- 5. When you kick a ball, the ..... energy of your foot transfers to it. So, it moves through the air.

### 7 Give reasons for :

- 1. The roller coaster doesn't need electricity during its movement down the hill.  
.....  
.....
- 2. The speed of the roller coaster increases as it moves down the hill.  
.....  
.....
- 3. The goal net vibrates when a ball hits it.  
.....  
.....

### 8 What happens to ... ?

- 1. The energy of the roller coaster when it moves down the hill.  
.....  
.....

2. The roller coaster when it loses its kinetic energy.



3. The energy of a stopped ball at the top of a ramp starts to move down.



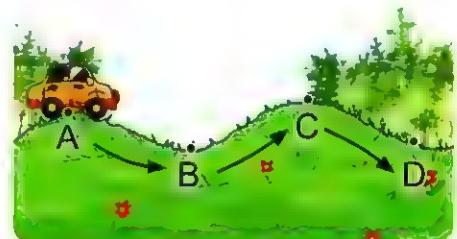
4. The potential energy of an object when it is placed at a height from the Earth's surface.



**9** Look at the following figure, then choose the correct answer :

1. The speed of the car increases when it .....

- a. stops at point (A).
- b. moves from (A) to (B).
- c. stops at point (C).
- d. moves from (B) to (C).



2. The speed of the car decreases when .....

- |                                  |                                       |
|----------------------------------|---------------------------------------|
| a. it moves from (A) to (B).     | b. its kinetic energy doesn't change. |
| c. its kinetic energy increases. | d. it moves from (B) to (C).          |

3. The kinetic energy of the car increases in all the following cases, except when the car .....

- |                           |                           |
|---------------------------|---------------------------|
| a. moves from (A) to (B). | b. moves from (C) to (D). |
| c. moves from (B) to (C). | d. speed increases.       |

# LESSON TWO

## Activity 4 Energy Basics

► Observe these pictures, then put (✓) in front of the bodies that have energy.



► From the previous concept, you have learned that there is a relation between energy, force and work, where :

- Force is the effect that changes energy to make it able to do work.
- So, we can define energy and work as follows :

### Energy:

It is the ability to do work or cause change.

### Work:

It is a force that causes an object to move a distance.

► Example to show the relation between energy and work :

- When a football player kicks a ball, the **force** of his kick causes the ball move in a different direction.
- Thus the player does **work** and he consumes **energy** (that he had obtained from food) to move his leg.
- So, the **work done** by this player causes the ball to move.



### Facts about energy :

1 Energy can be stored and changed from one form into another.

#### Example :

When you hold a ball, it stores **potential energy**, when you let it fall down to the ground, the ball is moving where the **potential energy** stored in it is changed into **kinetic energy**.



**2 We cannot see most forms of energy but, we can see and measure what energy can do.**

- We can't see most forms of energy such as : sound energy, thermal energy, electrical energy and chemical energy.
- We can see and measure what energy can do.



**Example :**

When you push a wooden box and this box moves, this means that the energy transfers from you to the box and also can be measured through the distance that the box moves.



**Check your understanding**

► Complete the following sentences :

1. The ability to do work is known as .....
2. The force that causes an object to move a distance is known as .....

► Put (✓) or (✗) :

1. Energy doesn't change from one form into another form. ( )
2. When you push a wall and this wall doesn't move, this means that you do work. ( )
3. The person who pushes a car forward and this car moves, this means that the person consumes energy. ( )

## Activity 5 Kinetic and Potential Energy

► Scientists classify energy into two types which are :

### 1 Potential energy

It is the amount of energy that is stored in an object due to its position.



#### Example :

The ball has potential energy stored in it when you lift it up away from the Earth's surface.

### 2 Kinetic energy.

It is the energy of an object due to its motion.

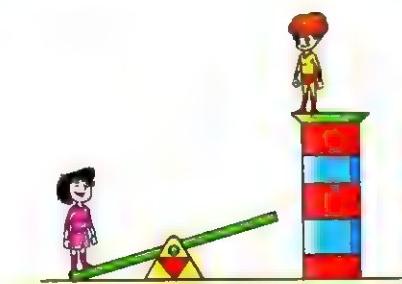


#### Example :

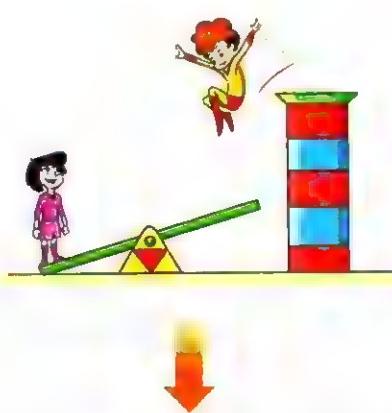
The ball has a kinetic energy when you let it fall down to the ground.

• Now, let's see an example to find out how the potential energy can be changed into kinetic energy.

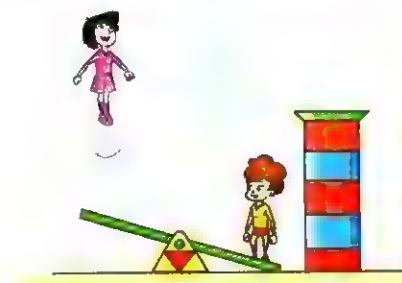
1 The boy on the tower has potential energy.



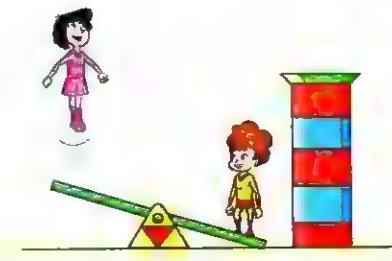
2 When he jumps down, his potential energy is converted into kinetic energy.



4 During the movement of the girl up in the air, her kinetic energy is converted gradually into potential energy.



3 The kinetic energy of the boy transfers to the girl who is standing on the seesaw and causes her to be pushed up into the air.



 **Note**

When an object has potential energy, so this object is ready to do work or to be active.



### Check your understanding

► Complete the following sentences :

1. Scientists classify energy into two types which are ..... energy and ..... energy.
2. The object has ..... energy stored in it when you lift it up away from the Earth's surface.

► Put (✓) or (✗) :

1. When an object is placed at a high place, it stores kinetic energy. ( )
2. Any object that moves has kinetic energy. ( )

**In the Assessment Book :**

**Try to answer :**

Self-Assessment (19)

# Exercises on Lesson 2

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. The form of energy that is stored in a book placed on a table is known as ..... energy.  
a. potential      b. thermal      c. light      d. sound
- 2. The energy of an object due to its motion is known as ..... energy.  
a. sound      b. thermal      c. potential      d. kinetic
- 3. The energy that is stored in an object due to its position, is known as ..... energy.  
(Giza 2023/Alexandria 2022)  
a. kinetic      b. potential      c. electrical      d. chemical
- 4. The form of energy that can be seen is ..... energy.  
a. thermal      b. electrical      c. light      d. sound
- 5. When you throw a stone in a lake, the ..... is transferred from the stone to the water surface.  
a. potential energy      b. pulling force  
c. gravity force      d. kinetic energy
- 6. When a ball on a certain height is left to fall down, .....  
a. its kinetic energy changes into potential energy.  
b. its potential energy changes into kinetic energy.  
c. its potential energy remains as it is.  
d. its kinetic energy remains as it is.
- 7. A stopped object placed at 10 meters high from the Earth's surface has ..... than the same object when it is placed at the ground.  
a. smaller potential energy      b. larger potential energy  
c. smaller kinetic energy      d. larger kinetic energy

## 2 The following table shows Samy in different situations. Choose from column (B)

- the type and the amount of energy that suits each situation in column (A) :

(A)	(B)
1. Samy stops at 5 meter high	a. he has a stored electrical energy.
2. Samy stops on the ground	b. he does not have potential or kinetic energies.
3. Samy walks slowly on the Earth's surface	c. he has a large amount of kinetic energy.
4. Samy runs fast on the Earth's surface	d. he has an amount of potential energy.
	e. he has a small amount of kinetic energy.

1. ....

2. ....

3. ....

4. ....

**3 Put (✓) or (✗) :**

- 1. We can see all the forms of energy. ( )
  - 2. Energy can be stored in the form of potential energy. ( )
  - 3. Any moving object has a form of energy known as kinetic energy. ( )
- (Alexandria 2023)
- 4. When an object is left to fall down to the Earth's surface, its potential energy is changed into kinetic energy. ( )
  - 5. We can measure the distance that an object moved as a result of pushing force. ( )
  - 6. To do work, you must push or pull an object for a certain distance. ( )
  - 7. If an object has energy so, it has the ability to do work. ( )
- 

**4 Write the scientific term of each of the following :**

- 1. The energy that is stored in an object due to its position at a certain height from the Earth's surface. (Luxor 2023 / Cairo 2022) (.....)
  - 2. The energy that the object gains due to its motion. (Luxor 2023 / Minia 2022) (.....)
  - 3. The ability to do work or cause change. (Alexandria 2023 / Ismailia 2022) (.....)
  - 4. The force that makes an object to move over a distance. (.....)
  - 5. The energy that is changed into kinetic energy when an object falls down to the Earth's surface. (.....)
- 

**5 Correct the underlined words :**

- 1. The ability to do force or cause change is known as energy. (.....)
  - 2. We cannot see all forms of energy, except thermal energy. (.....)
  - 3. As the object moves faster, its potential energy increases. (.....)
  - 4. The energy form stored in a stopped wooden box placed on a table is kinetic energy. (.....)
- 

**6 Complete the following sentences :**

- 1. If you have the ability to push a chair, so you have .....
- 2. When a force moves a ball over a distance, we can say that ..... is done.
- 3. If you let an object fall down from a high place so, its ..... energy changes into kinetic energy.

4. When an apple falls from a tree, its ..... energy will decrease.
- 5. Some types of energy can be seen such as ..... energy, while some other types of energy can't be seen such as ..... and ..... energies.
  - 6. If an object is placed at a height above the Earth's surface, it stores ..... energy.
  - 7. If a bird flies from the ground up to a high tree, its potential energy will .....
  - 8. If you move a bag placed on a table to the floor, its potential energy will .....

**7 Give reasons for :**

1. A bird stops on a tree has energy.
- .....  
.....  
.....

2. When a stone is thrown upwards, its potential energy increases.
- .....  
.....  
.....

**8 What happens if ... ?**

1. An apple falls from a tree to the ground. (according to the change in its energy).
- .....  
.....  
.....

2. You transfer a book from the ground to a higher shelf.

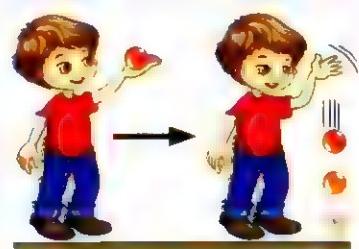
(according to its potential energy).

.....  
.....  
.....

**9 Look at the opposite figure, then complete the following sentences :**

1. When the boy lets the ball fall down,  
the ..... energy which is stored in the ball  
changes into ..... energy.

2. When the ball hits the floor and bounces up,  
its ..... energy will increase as it rises up.



**10** Look at the figures below, then choose the correct answer :



Book (a)

Book (b)

1. According to the potential energy, which of the following statements is correct ? .....
  - a. The two books have the same potential energy.
  - b. Book (a) has more potential energy.
  - c. Book (b) has more potential energy.
  - d. The two books have no potential energy.
  
2. If you transfer the book (a) onto table, its potential energy will .....
  - a. increase.
  - b. decrease.
  - c. not change.
  - d. be zero.

**11** Look at the two opposite figures, then choose the correct answer :

1. In figure (a), the acrobat (1) has .....
  - a. potential energy more than that of acrobat (2).
  - b. potential energy less than that of acrobat (2).
  - c. potential energy similar to that of acrobat (2).
  - d. no potential energy like acrobat (2).

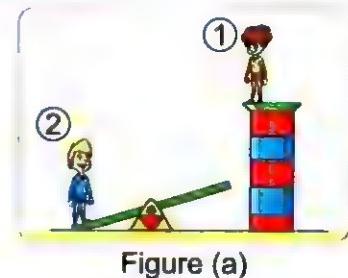


Figure (a)

2. In figure (b), during the rising up of the acrobat (2) into the air, his .....
  - a. potential energy decreases.
  - b. potential energy increases.
  - c. potential and kinetic energies increase.
  - d. potential and kinetic energies decrease.

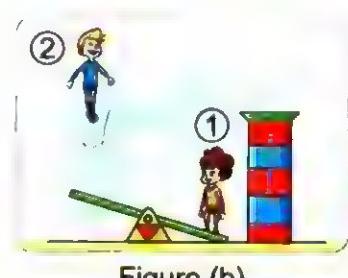


Figure (b)

# LESSON THREE

## Activity 6 Forms of Potential and Kinetic Energy

► Complete the sentences opposite the picture by writing potential or kinetic.

1. The ball has ... energy.

2. When the boy lets the ball fall down, the ball has  
energy.



► In the previous activities, you have learned that there are two categories of energy which are kinetic and potential energies.

- In this lesson, we will study some forms of potential and kinetic energies.

### Forms of potential energy

#### 1 Gravitational potential energy

#### 2 Chemical potential energy

#### Gravitational potential energy

- The Earth attracts objects to its surface by a force called gravitational force (gravity).
- When an object is raised up against the Earth's gravity, this object stores gravitational potential energy.

#### Example :

The roller coaster at the top of a hill stores  
gravitational potential energy.



#### Chemical potential energy

#### Example :

- The batteries store chemical potential energy.
- The chemical potential energy stored in the battery is not used until this battery is connected to a device.



#### Note

When a spring is compressed, it stores  
potential energy inside it.



Spring

## Factors affecting potential energy of an object :

### 1 Mass

By increasing the mass, the potential energy increases.

**Example :**

Ball (1) that has mass of 500 gram has a greater potential energy than ball (2) that has mass of 40 gram.

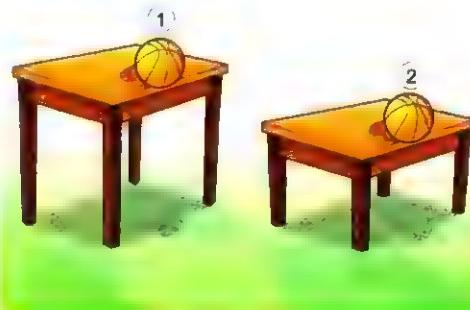


### 2 Height

By increasing the height from the Earth's surface, the potential energy increases.

**Example :**

Ball (1) at height 1 meter has a greater potential energy than ball (2) at height  $\frac{1}{2}$  meter.



## Forms of kinetic energy

### 1 Sound energy

as



Movement of sound waves in the air.



### 2 Light energy

as



Movement of light waves in the air.



### 3 Electrical energy

as



Movement of electricity through wires.



### 4 Thermal energy

as



Vibration of particles in a substance during heating.

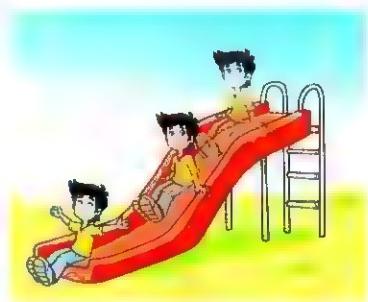


- From the previous lessons, you have known that energy is transformed (changed) easily from one form into another form such as :

### Changing of potential energy into kinetic energy:

**Example 1 :**

- A child at the top of a playground slide has potential energy.
- ↓
- When the child moves down along the slide, the potential energy changes into kinetic energy.



**Example 2 :**

- The egg has potential energy when it is in the boy's hand.
- ↓
- The egg has kinetic energy as it falls down.

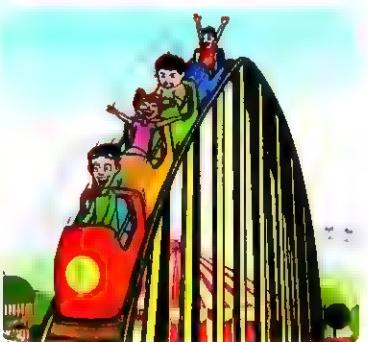


### Check your understanding

- Look at the opposite picture, then complete the sentences using these words :

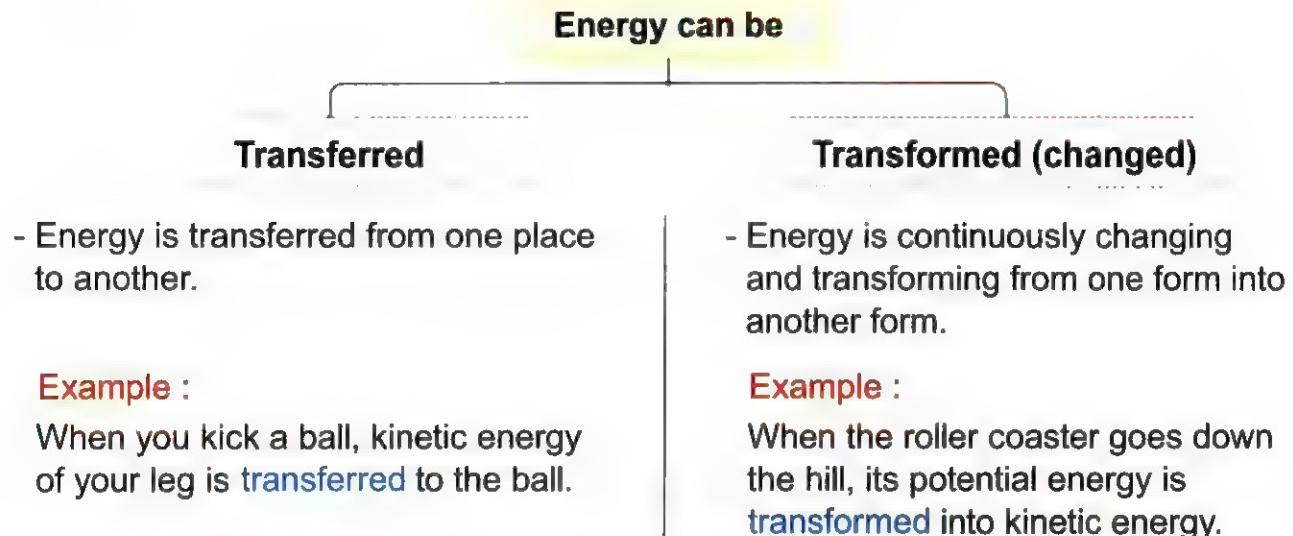
**(kinetic – potential)**

1. When the roller coaster is at the top of the hill, it stores ..... energy.
2. When the roller coaster goes down the hill, its potential energy changes into ..... energy.



## Activity 7 Types of Energy

- Energy is found everywhere around us.



### Some changes of potential energy into kinetic energy

<b>Example</b>	<b>Energy changes</b>	
	<b>From</b>	<b>Into</b>
Flashlight	Chemical energy stored in batteries.	Light energy and thermal energy (heat).
Gas oven	Chemical energy stored in natural gas.	Thermal energy.
Spring-powered car toy	Potential energy stored in the spring wire.	Kinetic energy, sound energy and thermal energy.
Real car	Chemical energy stored in gasoline.	Kinetic energy.

► From the previous explanation, we can conclude that :

- Energy can be stored in many different forms.
- New energy cannot be created and also existing energy cannot be destroyed.

### Note

- The food you eat also stores chemical energy.
- When you eat food, your digestive system breaks down the food and changes it into energy stored in your body.



### Check your understanding

► Complete the following table :

Example	Energy changes	
	From	Into
1. Electric fan :	Electrical energy	Kinetic energy
2. Door bell :	Electrical energy	.....
3. Radio :	.....	Sound energy
4. Electric lamp :	.....	.....

In the Assessment Book :

Try to answer :

Self-Assessment 20

# Exercises on Lesson 3

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. A ball at the top of a hill stores ..... energy.  
a. sound      b. light      c. chemical      d. potential
- 2. The stored energy in a battery of a flashlight changes into ..... , when it is turned on.  
a. chemical energy      b. sound energy  
c. light energy      d. potential energy
- 3. All the following examples store chemical energy, except .....  
a. food.      b. natural gas.      c. a battery.      d. a compressed spring.
- 4. Energy can do all the following, except .....  
a. It can be stored in an object.  
b. It can be transferred from an object to another one.  
c. It can be transformed from one form into another one.  
d. It can be destroyed and cannot be created.
- 5. If an object stops at a certain height from the Earth's surface for two hours then falls down, this means that .....  
a. its potential energy will be destroyed before two hours.  
b. its kinetic energy will be destroyed after two hours.  
c. its stored potential energy will change into kinetic energy.  
d. its stored kinetic energy will change into potential energy.
- 6. All the following examples have stored potential energy, except .....  
a. a stopped roller coaster at the top of a hill.  
b. a moving car on a flat road.  
c. a battery of a car.  
d. a compressed spring of a toy.
- 7. All the following examples represent kinetic energy, except .....  
a. light waves moving through the air.  
b. sound waves moving through the air.  
c. stored chemical energy in a car battery.  
d. water particles movement during heating.
- 8. The potential energy of an object depends on ..... (Cairo 2022)  
a. its mass only.  
b. its height from the Earth's surface only.  
c. its mass and its height from the Earth's surface.  
d. its temperature.
- 9. The type of potential energy that stored in batteries is called ..... potential energy.  
a. chemical      b. thermal      c. gravitational      d. light

- 10. All the following are forms of kinetic energy, except .....
  - a. light energy.
  - b. chemical energy.
  - c. sound energy.
  - d. electrical energy.
  
- 11. All types of energy can be classified into two main groups which are .....
  - a. light energy and sound energy.
  - b. chemical energy and electrical energy.
  - c. potential energy and kinetic energy.
  - d. magnetic energy and thermal energy.

(Cairo 2022)

**2 Choose from column (B) what suits it in column (A) :**

(A)	(B)
1. Sound energy	a. changes into another form of energy that can be stored inside the human body.
2. Light energy	b. when it reaches our ears, it causes hearing.
3. Thermal energy	c. changes into electrical energy in a flashlight.
4. Stored chemical energy in food	d. is produced from electric heater.
5. Stored chemical energy in a battery	e. when it reaches the nose, it causes smelling.
	f. when it reaches our eyes, it causes vision.

1. .... 2. .... 3. .... 4. .... 5. ....

**3 Put (✓) or (✗) :**

- 1. New energy cannot be created, but existing energy can be destroyed. ( )
- 2. A compressed spring stores potential energy. ( )
- 3. As the height of an object from the Earth's surface increases, its potential energy increases. (Suez 2023) ( )
- 4. Kinetic energy cannot be transformed into potential energy. ( )
- 5. Light waves are form of potential energy. ( )
- 6. We can see the movement of electricity through a wire. (Suez 2023) ( )
- 7. You can change kinetic energy into stored potential energy when you compress a toy spring. ( )
- 8. In gas oven, the chemical energy is changed into thermal energy. ( )
- 9. Objects that have the same masses and placed at the same height, have the same potential energy. ( )

**4 Write the scientific term of each of the following :**

- 1. It is the stored potential energy in a car battery. (.....)
- 2. It is a form of kinetic energy that can move through the air and we can see it. (.....)
- 3. It is a form of kinetic energy due to vibrations of particles in a substance as it heats up. (.....)
- 4. It is a form of potential energy that pulls objects towards the Earth's surface. (.....)

**5 Correct the underlined words :**

- 1. When an object falls from a certain height, its stored potential energy changes into chemical energy. (.....)
- 2. The energy that is resulted due to the vibration of particles in a substance as it heats up, known as sound energy. (.....)
- 3. As the height of an object from the Earth's surface decreases, its potential energy increases. (.....)
- 4. Thermal, chemical, electrical and light energies are forms of kinetic energy. (.....)
- 5. A car battery stores a form of kinetic energy known as chemical energy. (.....)
- 6. A fan turns the chemical energy stored in natural gas into thermal energy.

(Alexandria 2022) (.....)

**6 Complete the following sentences :**

- 1. Among the forms of potential energy ..... and ..... energies, while ..... energy is a form of kinetic energy.
- 2. The energy which is stored in a ball at the top of a hill is ..... potential energy. (Cairo 2022 / Kafr El-Sheikh 2022)
- 3. Thermal energy is considered as one of the forms of ..... energy.
- 4. Some forms of kinetic energy travel in air in the form of waves such as ..... and ..... energies.
- 5. Electrical energy is changed in loudspeakers into ..... energy, while it is changed in the electric fan into ..... energy.
- 6. In the electric bell, ..... energy changes into ..... energy.
- 7. The chemical energy in the battery of a flashlight can be changed into ..... and ..... energies.
- 8. In gas oven, ..... energy changes into ..... energy. (Giza 2022)
- 9. When a ball is on a table, it stores ..... energy, while as it falls down to the ground, this energy changes into ..... energy.

10. When you clap your hands, the kinetic energy changes into ..... energy, while when you rub your hands together, the kinetic energy changes into ..... energy.
11. Fireworks produce sound and ..... energies which are considered as forms of ..... energy.
12. Television needs ..... energy to be operated and changes it into ..... and ..... energies which are forms of kinetic energy.

**7 Give reasons for :**

- 1. Electric lamp produces different forms of energy.
  
- 2. On winding up the spring of a toy car, then let it free, the car moves.

**8 What happens if ... ?**

- 1. You operate a washing machine. (according to the change of energy).
  
- 2. A boy moves down the slide. (according to the change of energy).
  
- 3. You switch on an electric lamp. (according to the change of energy).

**9 Cross out the odd word :**

1. Sound energy – Electrical energy – Thermal energy – Chemical energy. (.....)
2. Sound energy – Light energy – Electrical energy – Thermal energy. (.....)

**10 Look at the opposite figure, then choose the correct answer :**

1. Mazen has a big amount of .....
  - a. potential energy.
  - b. kinetic energy.
  - c. both potential and kinetic energies.
  - d. both potential and light energies.
  
2. Which of the following sentences is correct ?
  - a. Amir has kinetic energy more than that of Mazen.
  - b. Amir has potential energy more than that of Mazen.
  - c. Amir has kinetic energy equal to that of Mazen.
  - d. Amir has potential energy equal to that of Mazen.
  
3. The potential energy of the ball is ..... Amir.
  - a. more than that of
  - b. equal to the kinetic energy of
  - c. equal to that of
  - d. less than that of



# LESSON FOUR

## Activity 8 Easy Life Tool

- You have learned a lot about different forms of energy and how they can transform from one form into another.
- Now, you can use this knowledge to design a tool that helps us to do work.

Example :

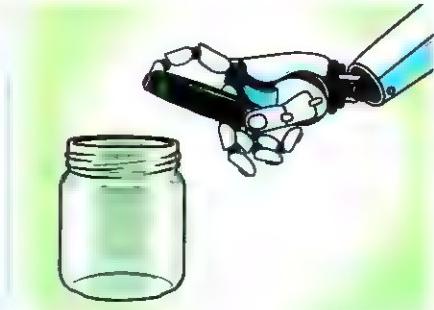
• The tool : A robot hand

• Its function :

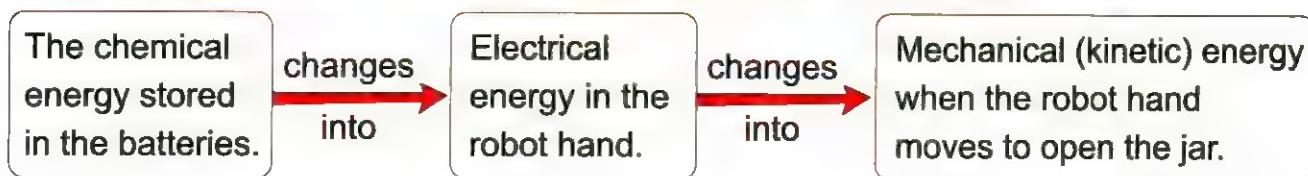
Opening the jar cap that it is hard to be opened.

• The source of energy :

The robot gets power from batteries when it is turned on.



### The changes of forms of energy inside the robot :



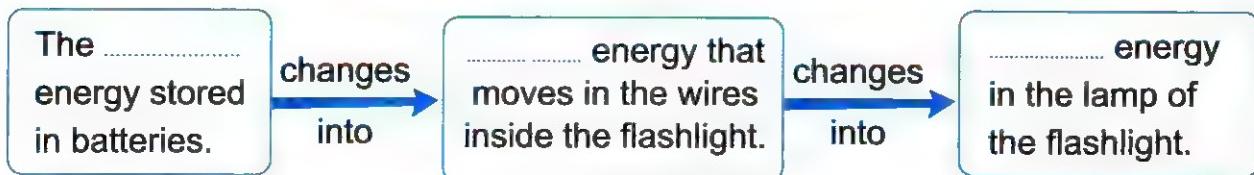
#### ► From the previous explanation, we can conclude that :

- Energy is not created or destroyed when transferred from the battery to the robot hand.
- Energy is converted from one form (chemical energy) to another form of energy (mechanical energy) when the robot hand opens the jar.



### Check your understanding

#### ► Complete the following diagram that shows the changes of energy when you switch on a flashlight :



## Activity 9 | Record Evidence like A Scientist

- In this concept, you have learned about energy, motion, forms of potential energy and kinetic energy, and energy transformation in engines.
- Now, try to think like a scientist by writing your claim, your evidence and your scientific explanation about one of the main points of this concept through the four steps you have learned in the previous concepts.

### Step 1 The Question

How do moving objects get energy and what are the changes of energy that take place inside them?

### Step 2 My Claim

.....  
.....  
.....

### Step 3 My Evidence

.....  
.....  
.....

### Step 4 My Scientific Explanation

.....  
.....  
.....

### Review on Concept (2.2)

To review this concept look at the **Assessment Book**  
**"Part 2 : Final Revision".**

**In the Assessment Book :**

**Try to answer :**

- Self-Assessment (21)
- Model Exam on Concepts (2.1) & (2.2)

# **Exercises on Lesson 4**

## ● Understand

### ● Apply

### ● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. Chemical energy can be stored in ..... (Giza 2022)  
a. food only. b. battery only.  
c. television and food. d. food and battery.

• 2. Humans cannot live without ..... to obtain the needed energy for doing their activities.  
a. reading books b. driving cars  
c. watching television d. eating food

• 3. When you jump high, the force affecting you must be .....  
a. balanced. b. unbalanced. c. created. d. destroyed.

• 4. The force that is found between a moving car and the ground, which opposes its movement is known as .....  
a. pushing force. b. electrical energy.  
c. magnetic energy. d. friction force.

• 5. When an object begins to move down a hill, the potential energy stored in it changes into .....  
a. less active energy. b. more active energy.  
c. light energy. d. electrical energy.

**2** Choose from column (B) what suits it in column (A) :

(Cairo 2022)

(A)	(B)
1. Food	a. It can be transformed into potential energy.
2. Kinetic energy	b. He has only kinetic energy.
3. Potential energy	c. It is the source of energy for humans.
4. When a child is running on the ground.	d. It is the stored energy in an object.
5. When a child is standing on the ground without moving.	e. He has no kinetic energy.
	f. It cannot be transferred into another form of energy.

## 1. ....

2. ....

3. ....

4. ....

5.

**3** Put (✓) or (✗) :

- 1. Orange, potato and battery contain stored chemical energy. ( )
- 2. A car does work when it moves from one place to another. ( )
- 3. Burning of food inside our bodies produces energy that allow us to do our activities. ( )
- 4. Transformation of potential energy into kinetic energy during your sliding down on a slide, proves that the energy can be created but cannot be destroyed. ( )
- 5. The stored kinetic energy changes into potential energy, when the gravity pulls a ball in the air back down to the ground. ( )
- 6. Energy obtained from food is important for your body to move and do different activities. ( )
- 7. When you are jumping to a certain height, the mass of your body doesn't affect your potential energy. ( )

**4** Write the scientific term of each of the following :

- 1. The type of fuel that is used inside the car to obtain kinetic energy. (.....)
- 2. The energy that is stored in both food and batteries. (.....)
- 3. The energy that is stored in your body during your jumping into the air. (.....)
- 4. The energy that is produced when an object begins to move. (.....)

**5** What happens if ... ?

1. Food burns inside the human body.
- .....  
.....

2. You put a battery inside a flashlight, then you switch it on.

(according to the change of energy).

.....  
.....

**6** Write each of the following words in front of the suitable sentence below :

(Flashlight – Gas oven – Food)

1. Its burning changes the chemical energy into kinetic energy inside our bodies. (.....)
2. It changes chemical energy into thermal energy to be used in cooking. (.....)
3. It changes chemical energy into light and thermal energies. (.....)

**7** Complete the following sentences below pictures :

changes  
into



changes  
into



1. Batteries inside the radio store ..... potential energy.

2. ..... energy in the wires inside the radio.

3. ..... energy produced from the radio speaker.

# Model Exam 1

1

## **on Concept (2.2)**

**Total mark**

15

**1 (A) Choose the correct answer :**

(5 marks)

- When an object moves down a ramp, its stored potential energy .....
    - increases.
    - doesn't change.
    - changes to a less active form of energy.
    - changes to a more active form of energy.
  - The form of energy that can be seen is .....
    - thermal energy.
    - electrical energy.
    - light energy.
    - sound energy.
  - All the following examples store chemical energy, except .....
    - food.
    - gasoline.
    - a battery.
    - a compressed spring.
  - When you jump high in the air, the forces affecting you must be .....
    - balanced.
    - unbalanced.
    - created.
    - destroyed.

**(B) Give a reason for the following :**

Both the Sun and electric lamp produce two forms of energy.

**2 (A) Put (✓) or (✗) :**

(5 marks)

1. The objects that don't move have no energy. ( )
  2. To do work, you must push or pull an object through a certain distance. ( )
  3. Light waves is a form of potential energy. ( )
  4. Orange, potato and car battery contain stored chemical energy. ( )

**(B) Complete the following sentences below pictures :**



1. Batteries inside the radio store ..... potential energy.

2. .... energy in the wires inside the radio.

3. .... energy produced from the radio speaker.

**3 (A) Correct the underlined words :**

(5 marks)

1. When an object falls down, it has more active form of energy known as potential energy. (.....)
2. Sound energy produced from the gas oven is used in cooking food. (.....)
3. A battery stores a form of kinetic energy known as chemical energy. (.....)
4. Gasoline contains electrical potential energy. (.....)

**(B) What happens if ... ?**

A stopped ball at the top of a slope starts to move down.

(according to the change of its energy)

.....  
.....

# Model Exam 2

2

## on Concept (2.2)

Total mark

15



(A) Write the scientific term of each of the following :

(5 marks)

1. The form of energy that the object has due to its movement. (.....)
2. The energy that is used to operate all electric devices. (.....)
3. The form of energy that is stored inside an object placed at a high place from the ground. (.....)
4. The energy that is stored in both food and batteries. (.....)

(B) Cross out the odd word :

Sound energy – Electrical energy – Thermal energy – Chemical energy. (.....)

2 (A) Choose the correct answer :

(5 marks)

1. When you stop on the ground without moving, so you have .....  
a. the most kinetic energy.      b. no kinetic energy.  
c. the most potential energy.      d. the least light energy.
2. All the following forms of energy do not affect the movement of a moving object, except .....  
a. sound energy.      b. light energy.  
c. electric energy.      d. kinetic energy.
3. The most potential energy stored in an object, is that when it is .....  
a. moving on the ground.  
b. at the top of a hill.  
c. standing without movement on the ground.  
d. at the bottom of a hill.
4. The stored energy in a battery of a flashlight changes into ..... when it is turned on.  
a. chemical energy.      b. sound energy.  
c. light energy.      d. potential energy.

(B) What happens if ... ?

You switch on an electric lamp. (according to the change of energy).

**3 (A) Put (✓) or (✗) :**

(5 marks)

1. As the height of an object from the Earth's surface increases, its potential energy decreases. ( )
2. Energy doesn't transfer from an object to another. ( )
3. New energy cannot be created, but existing energy can be destroyed. ( )
4. Burning of food inside our bodies produces energy that allow us to do our activities. ( )

**(B) Give a reason for the following :**

A bird stops on a tree has energy.

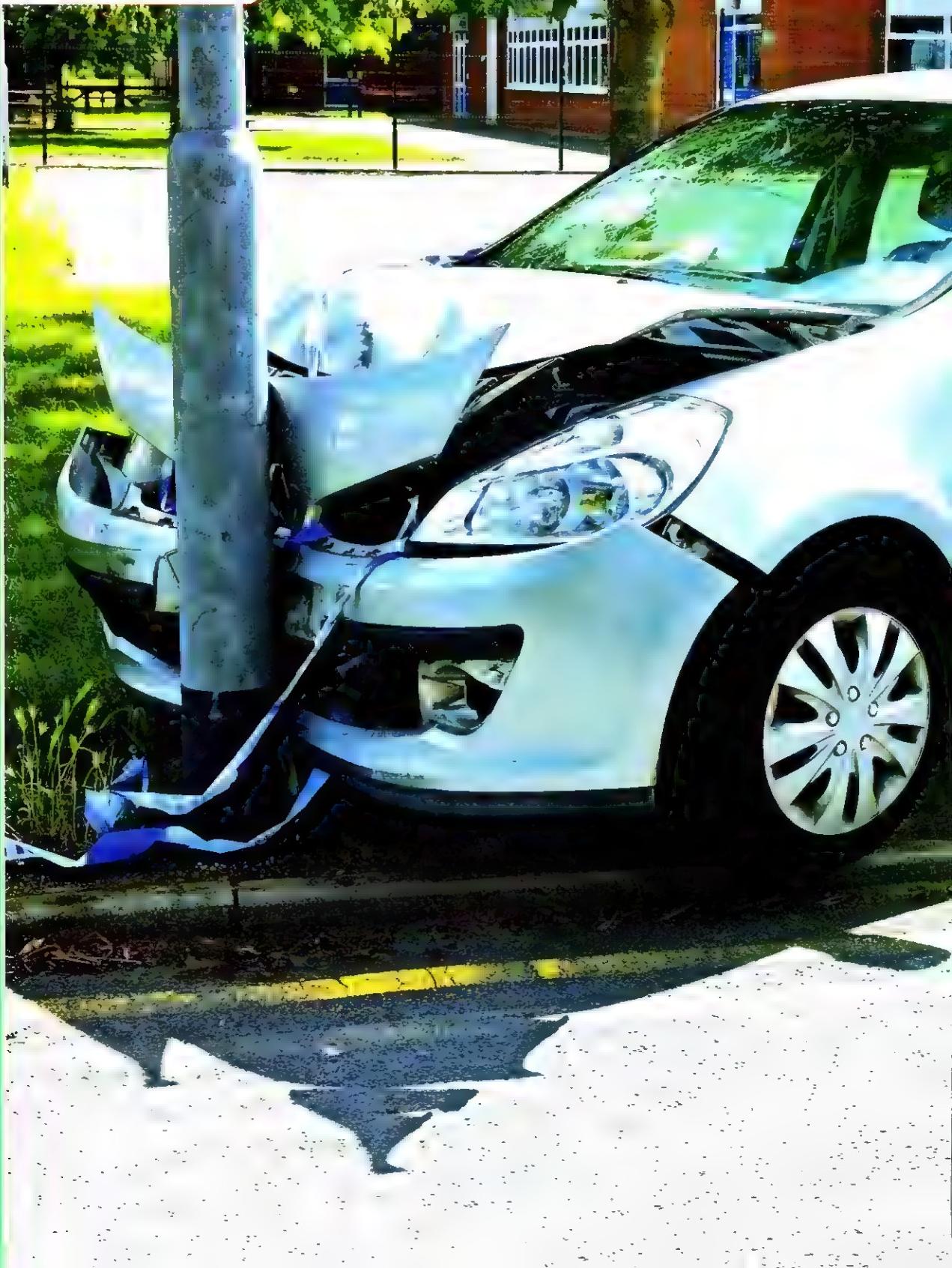
.....

.....

**Concept**

# **2.3**

## **Energy and Collisions**





## Learning outcomes

**By the end of this concept, your child will be able to :**

- Analyze and interpret data to describe how the speed and mass of objects relate to changes observed in a collision.
- Construct an explanation based on evidence and logical reasoning to describe energy transfer in a collision.
- Apply mathematical thinking to organize data to represent patterns related to mass, speed and the energy of objects.

## Key vocabulary

- Collision
- Mass
- Speed

## Notes For Parents On Concept [2.3]

<b>Lessons</b>	<b>Activities</b>	<b>What you should do with your child</b>
<b>1</b>	<b>Activity 1</b>	Discuss with your child that faster and heavier objects have more energy than slower and lighter ones.
	<b>Activity 2</b>	Help your child to know that kinetic energy can transfer from one object to another.
	<b>Activity 3</b>	Help your child to find out some online sources to learn more about the importance of seatbelts and airbags during accidents.
<b>2</b>	<b>Activity 4</b>	Help your child to know the relation between speed, distance and time.
	<b>Activity 5</b>	Discuss with your child the relation between the speed and kinetic energy of an object that moves on a ramp and the angle of inclination.
<b>3</b>	<b>Activity 6</b>	Discuss with your child the meaning of collision and let him/her mention some examples of collision between objects.
	<b>Activity 7</b>	Discuss with your child the effect of speed on collision between objects.
<b>4</b>	<b>Activity 8</b>	Let your child to do a simple experiment to find out the relation between force, speed and kinetic energy of a moving object.
	<b>Activity 9</b>	Discuss with your child the effect of mass on collision between objects.
	<b>Activity 10</b>	Discuss with your child how kinetic energy transfers between objects.

# LESSON ONE

## Activity 1 Can You Explain ?

The truck (heavier object) has :

- More mass
- More speed
- More energy



The small car (lighter object) has :

- Less mass
- Less speed
- Less energy

### ► What happens to objects when they collide with each other ?

- In the example above, if the truck is the faster object it has more energy than the car which is the slower object.

Therefore, during collision, the object that has more energy (the truck) causes more damage than that has less energy (the car).

### Example of collision :

#### A wrecking ball :

- It is a very heavy steel ball that swings on a cable.
- It is used to collide with walls of a building to help construction workers knock down walls or parts of buildings.



Wrecking ball

### ► In this concept, we will study :

- Collision of objects.
- Basics of speed.
- Energy and collision.
- The effect of speed and mass on collision.
- Energy conversions during a collision.

heavier  
lighter  
collision

أثقل  
أخف  
اصطدام

الكتلة  
شاحنة  
كرة الهدم

فولاذ  
ضرر  
البناء

يهدم  
مبادئ  
البناء

**Activity 2 Collision**

► Look at this picture, then put (✓) or (✗) :

1. The ball transfer its kinetic energy to the bat. ( )
2. The ball will move in different direction, when the bat hits it. ( )

**Collision in cricket :**

- A cricket is a popular game all over the world.
- In cricket, a player uses a wooden bat to hit a ball.
- The cricket player holds a bat and moves it as the ball comes towards him at high speed to collide with the bat.



► What happens to the energy of the moving bat when it hits the moving ball ?

- The bat transfers its kinetic energy to the ball.
- Then, the speed of the ball increases and the ball returns back in a different direction.
- This collision produces a popping sound and the player would feel the bat hitting the ball.

**Check your understanding**

► Put (✓) or (✗) :

1. After collision between a ball and a bat, the direction of the ball will not change. ( )
2. During collision between a ball and a bat, the kinetic energy transfers from the bat to the ball. ( )

bat  
hits

مضرب  
يضرب  
transfer  
popular

ينقل  
معروفة  
popping sound

صوت فرقعة

## Activity 3 Watching Objects Collide

### ► What happens to the driver's body when the car stops suddenly ?

- The driver's body continues to move forward where the objects that are in motion stay in motion until something stops them.
- But,** What are the safety equipment that keep the driver and passengers in their places ?

### Safety equipment used during collision of cars :

#### 1 Seatbelts :

They are used in cars to keep the driver and also the passengers from moving forward when the car stops suddenly, so seatbelts have saved thousands of lives.



#### 2 Airbags :

##### Their structure :

Airbags are made up of thin nylon material folded into the steering wheel, seats, dashboard or doors.

##### Idea of operation :

During collision	After collision
<ul style="list-style-type: none"> <li>Airbags inflate automatically when sensors in the car detect a crash.</li> <li>A sensor tells the airbags to inflate and fill with a gas to provide a soft cushion.</li> </ul> 	<ul style="list-style-type: none"> <li>Airbags deflate almost as fast as they inflate, because they have holes (vents) to allow them to deflate, so the driver can get out of the car.</li> </ul> 

##### Their importance :

- Airbags slow the speed of the driver's motion forward.
- Airbags absorb the energy of the passengers on collision.

safety equipment وسائل الأمان  
seatbelt حزام الأمان  
airbags وسائد هوائية

suddenly فجأة  
inflate تنسفخ  
absorb تتصبّص  
steering wheel عجلة القيادة  
dashboard لوحة التحكم  
sensor جهاز الاستشعار  
cushion وسادة  
passengers راكبين  
deflate تذكّميش

وسادة راكبين تذكّميش  
راكبين تذكّميش  
وسادة راكبين تذكّميش  
راكبين تذكّميش  
واسادة راكبين تذكّميش  
واسادة راكبين تذكّميش

## ?

### Give a reason for ...

Airbags deflate quickly after few seconds of collision.

- Because they contain small holes (vents), through which the gas comes out, so the driver can get out of the car.

### Collisions between trains and cars :

- There are many accidents in which a train hits a car that may be stuck on the train tracks.
- Trains are much larger than cars. Also, trains can travel at a high speed.
- It is more dangerous, as the force of the collision between the car and train increases.



### Check your understanding

#### ► Complete the following sentences :

1. Safety equipment of cars during collision include ..... and .....
2. Airbags are made up of thin ..... material.
3. In cars, ..... protect passengers during collision where they inflate automatically when sensors in the car detect a crash.

In the Assessment Book :

Try to answer :

Self-Assessment (22)

# Exercises on Lesson 1

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

1. When objects collide with each other, ..... is transferred between them.  
a. time      b. distance      c. energy      d. nothing
2. The object that has the most kinetic energy, is ..... object.  
a. the fastest and lightest      b. the slowest and lightest  
c. the fastest and heaviest      d. the slowest and heaviest
3. A wrecking ball is made of .....  
a. plastic.      b. nylon.      c. steel.      d. wood.
4. In cricket game, the bat transfers its ..... energy to the ball.  
a. kinetic      b. potential      c. thermal      d. chemical
5. Collisions usually produce .....  
(Sohag 2023)  
a. solar energy.      b. sound energy.  
c. gravitational potential energy.      d. chemical potential energy.
6. When the cricket bat hits the ball, the ball direction ..... and the ball speed .....  
a. doesn't change – doesn't change.  
b. doesn't change – changes.  
c. changes – doesn't change.  
d. changes – changes.
7. Seatbelts work when the car .....  
a. decreases its speed gradually.      b. increases its speed gradually.  
c. suddenly stops.      d. stops gradually.
8. If there is nothing to stop a moving object, this object will .....  
a. stay in motion.      b. stop after few hours.  
c. stop after few minutes.      d. stop after few seconds.
9. When a car that moves forward stops suddenly, the passengers move .....  
a. backward.      b. forward.      c. upward.      d. downward.  
(Cairo 2023)
10. Airbags in the car are folded into all the following places, except .....  
a. steering wheel.      b. dashboard.  
c. doors.      d. tires.

**2** Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Wrecking ball	a. it is one of the safety equipment in cars that is inflated with a gas during crashes.
2. Cricket bat	b. it changes its sound energy into light energy.
3. Seatbelt	c. it is used to hit a ball during playing.
4. Airbag	d. it is one of the safety equipment in cars that keeps passengers in their places during crashes.
	e. it is used to hit a wall during destruction of a building.

1. ....

2. ....

3. ....

4. ....

**3** Put (✓) or (✗) :

- 1. When a cricket bat hits the ball, its potential energy transfers to the ball. ( )
- 2. Seatbelt is one of the safety equipment in cars. (Cairo 2023) ( )
- 3. During a crash between two cars, the potential energy transfers from the faster car to the slower one. ( )
- 4. After car collision, the airbags deflate as fast as they inflate. ( )
- 5. When a fast car hits a very big tree, the kinetic energy of the car transfers into the tree. ( )

**4** Write the scientific term of each of the following :

- 1. A heavy steel ball that swings on a cable and is used in destruction of parts of buildings. (Luxor 2023) (.....)
- 2. Safety equipment used to prevent car passengers from moving forward when the car stops suddenly. (.....)
- 3. Safety equipment used to provide soft cushion when it is inflated automatically with a gas during collision of cars. (.....)
- 4. They are present in car airbags and allow them to deflate fast after collision. (.....)

**5** Correct the underlined words :

- 1. A fast and heavy object has more potential energy than a slow and light object. (.....)
- 2. Football is used to collide with buildings to knock down their walls. (.....)

3. When a train at a high speed hits a car, the train gets more damage. (.....)
4. As a result of hitting the ball with the wooden bat, the speed of the ball doesn't change. (.....)
5. Seatbelts absorb the energy of the passengers during collision when inflated. (Sohag 2023) (.....)
6. Airbags are made up of thick wooden material. (.....)
7. The cricket bat transfers its light energy to the ball. (.....)

#### **6 Complete the following sentences :**

- 1. When a bat hits a ball strongly, the ..... energy of the bat is transferred to the ball and the speed of the ball increases.
  - 2. Among safety equipment which are used during collision of cars ..... and .....
  - 3. As a result of collision between the ball and the bat, the direction of the ball will .....
  - 4. During a car crash, the ..... is inflated with a gas to provide a soft cushion.
  - 5. Airbags absorb the ..... of the passengers during collision.
  - 6. When objects collide with each other, ..... is transferred between them.
  - 7. In cars, the ..... prevents passenger from moving forward when the car suddenly stops.
- (Giza 2023)

#### **7 Give reasons for :**

- 1. Seatbelts in cars are very important.
- .....

- 2. Airbags in cars are very important.
- .....

- 3. The speed of the ball increases when the bat hits it hard.
- .....

#### **8 What happens if ... ?**

- 1. The moving cricket bat hits a ball (according to the transfer of energy).
- .....
- 2. Airbags in a car don't inflate during a crash.
- .....

- 9** Look at the opposite photo that shows a tennis player, then choose the correct answer :

1. .... energies are produced from the collision between the racket and the ball.
  - a. Electrical and kinetic
  - b. Kinetic and light
  - c. Electrical and sound
  - d. Kinetic and sound
  
2. When the racket hits the ball, the ..... of the ball is changed.
  - a. size
  - b. mass
  - c. direction
  - d. color
  
3. During hitting the ball with the racket, all the following sentences are correct, except .....
  - a. the ball changes its direction.
  - b. kinetic energy transfers from the racket to the ball.
  - c. the speed of the ball changes.
  - d. the size of the ball decreases.



- 10** Look at the opposite photo that shows a crash between a train and a car, then answer the questions below :

- 1. In your opinion, which one of them is damaged more than the other ? (Give a reason for your answer).
- .....
- .....



- 2. What happens to the car airbags during the crash ?
- .....
- .....

# LESSON TWO

## Activity 4 Basics of Speed

► Look at this picture, then put (✓) or (✗) :

1. The speed of the motorcycle affect the amount of damage that will happen to the ice cream cart. ( )
2. The kinetic energy of the motorcycle transfers to the ice cream cart during collision. ( )



- In this activity we will study the meaning of speed and how we calculate it.

### Basics of speed :

- Speed is a measurement of how fast something is moving.

### Speed :

It is the distance that an object travels in a certain amount of time.

### Calculating the speed :

- To calculate the speed of any moving object, we can divide the **distance** that the object moves by the **time** taken to travel that distance as follows :

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} \rightarrow (\text{measured in Kilometer or meter})$$
$$\qquad\qquad\qquad \longrightarrow (\text{measured in hour or second})$$

So, we can define speed also as, **distance per unit time**.

The measuring unit of speed may be :

Kilometer Per Hour (km/hr)

Meter Per Second (m/sec)

### Note

The speed of an object is not affected by the **direction** of this moving object.

### Example :

If a car moves forward 5 meters in one second, then it moves backward 5 meters in one second, so its speed is still 5 meters per second.

### Problems :

1. Amir runs 100 meters in 20 seconds. Calculate the speed of Amir.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Speed} = \frac{100}{20} = 5 \text{ m/sec.}$$

Distance = 100 m.

Time = 20 sec.

affected  
measurement

يتأثر  
قياس

distance per unit time

المسافة لوحدة الزمن

certain  
motorcycle

مدين  
دراجة نارية

**2. If a bus traveled 600 kilometers in 5 hours. Calculate the speed of the bus.**

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Speed} = \frac{600}{5} = 120 \text{ km/hr.}$$

Distance = 600 km.  
Time = 5 hours

### Comparing the speed of two moving objects :

► To compare the speed of two moving objects, we can use one of the following two ways :

**1. Measure the distance that both objects travel in the same amount of time.**

- The object that travels a greater distance in the same amount of time is moving at a greater speed.

- Example :

If two runners run for 1 hour, where :

- The first runner travels 6 kilometers.
- The second runner travels 9 kilometers.

So, the second runner is moving at a greater speed, because he travels a greater distance (9 km) in the same amount of time (1 hour).



**2. Measure the time that both objects take to travel the same distance.**

- The object that travels the same distance in a smaller amount of time is moving at a greater speed.

- Example :

If two cars are racing 120 kilometers, where :

- The first car reaches the end line of race in 1 hour.
- The second car reaches the end line of race in 2 hours.

So, the first car is moving at a greater speed, because it travels the same distance (120 kilometers) in a shorter time (1 hour).



### Check your understanding

► Complete the following sentences using the words below :  
**(speed – faster – slower)**

1. A car that travels 90 kilometers per hour is ..... than a car that travels 60 kilometers per hour.
2. Two bicycles are racing for 500 meters, the bicycle that finishes the race in a greater time is ..... than the bicycle that finishes in a shorter time.
3. The distance per unit time is known as .....

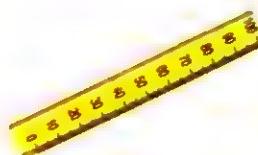
## Activity 5 [Racing Downhill]

- You have learned about speed and energy, in this activity you will measure the speed and the kinetic energy of an object moving down a cardboard tube at various incline angles.
- Now, let's study the relation between speed and kinetic energy.**

### ► Tools



Toy truck



Metric ruler



Cardboard paper towel tube



Paper cup



Stopwatch



Scissors



Books

### ► Steps

#### Part (1) : The relation between the speed and the angle of inclination.

- Put one end of the tube on the top of two books, and the other end of the tube resting on the ground.
- Record in a table the number of books used to set up the tube in the column "Number of books".
- Roll the truck down the tube. Use the stopwatch to determine the time and record in the table how long the truck takes to travel to the end of the tube in the column "Time to travel".
- Add one book to change the incline angle and repeat the steps, then add another book and repeat the steps again.



### 💡 Note

As the "Time of travel" is less, the speed of the toy truck is higher.

cardboard tube  
incline angle  
towel

أبوبية من الورق المقوى  
زاوية الانحدار  
منشفة / فوطة

angle of inclination  
resting  
determine

زاوية الميل  
مستقرة  
تحدد

عمود  
مسطحة متربعة

**Part (2) : The relation between the kinetic energy and the angle of inclination.**

5. Now, repeat the activity as in part (1), but place the paper cup at the bottom of the tube as shown in the figure.

6. Measure the distance the cup moves each time after the truck rolls into it, and record in the table the distance that the cup travels in the column "Distance the cup traveled"



### Note

As the "Distance the cup traveled" is longer, the kinetic energy of the toy truck is greater.

Number of books	Part (1)	Part (2)
	Time to travel	Distance the cup traveled
2 books	5 seconds	3 cm
3 books	3 seconds	4 cm
4 books	2 seconds	7 cm

### ► Observations

- As the angle of inclination increases, the speed of the truck increases as it takes less time to reach the end of the tube.
- As the angle of inclination increases the distance that the paper cup traveled increases.

### ► Conclusions

- As the speed of a moving object increases, its kinetic energy increases.
- Both speed and kinetic energy increase, as the angle of inclination increases.



### Check your understanding

#### ► Complete the following sentences using the words below :

(increases - faster - kinetic)

1. If the incline of a ramp increases, the object rolling down it will be .....
2. When the speed of an object increases, its kinetic energy .....
3. We can use the speed of an object to know the ..... energy of this object.

In the Assessment Book :

Try to answer :

Self-Assessment (23)

# Exercises on Lesson 2

● Understand

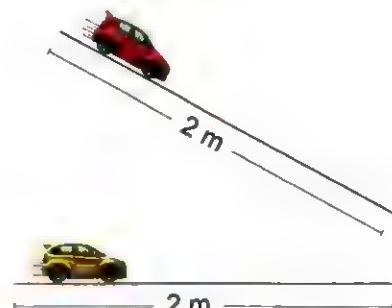
○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. The measuring units of distance are .....
    - a. second and meter.
    - b. hour and kilometer.
    - c. hour and second.
    - d. kilometer and meter.
  - 2. ..... and ..... are the main factors that we need to calculate the speed of an object.
    - a. time - kinetic energy
    - b. distance - kinetic energy
    - c. distance - time
    - d. kinetic energy - potential energy
  - 3. How can we calculate the speed of an object ? ..... (*Luxor 2023 / Alexandria 2022*)
    - a. Speed = distance ÷ time
    - b. Speed = distance × time
    - c. Speed = distance + time
    - d. Speed = distance – time
  - 4. Which of the following is a measuring unit of speed ? .....
    - a. hr/km.
    - b. sec/m.
    - c. kg/sec.
    - d. m/sec.
- (*Menofia 2023 / Cairo 2022*)
- 5. What is the speed of a car that travels 400 meters in 4 second ? .....
    - a. 100 m/sec.
    - b. 20 m/sec.
    - c. 30 m/sec.
    - d. 40 m/sec.
  - 6. When the kinetic energy of a moving body ..... , its speed ..... (*Sharkia 2023*)
    - a. increases – doesn't change.
    - b. increases – increases.
    - c. decreases – doesn't change.
    - d. decreases – increases.
  - 7. As the angle of a ramp decreases, the speed of a toy car rolling on it ..... and its kinetic energy .....
    - a. increases – decreases.
    - b. increases – increases.
    - c. decreases – decreases.
    - d. decreases – increases.
  - 8. An object keeps moving with same speed when .....
    - a. its kinetic energy decreases.
    - b. its potential energy increases.
    - c. no another force stops it.
    - d. another object collides with it.
  - 9. If the angle of inclination of a hill increases, the kinetic energy of an object moving down it will .....
    - a. decrease.
    - b. increase.
    - c. remain as it is.
    - d. be destroyed.

- 10. The following figures show a ramp and a flat surface of 2 meters length for each. If two toy cars of equal mass are pushed with equal force at the same moment, so .....
  - a. both cars reach the end of the ramp at the same moment.
  - b. the yellow car reaches the end of the ramp first.
  - c. the red car reaches the end of the ramp first.
  - d. the yellow car has kinetic energy larger than that of the red car.

**2** Put (✓) or (✗) :

- 1. The speed is a measurement of how fast something is moving. ( )
- 2. The speed is distance per unit time. ( )
- 3. We can measure the covered distance in kilometer unit. (*Minia 2023*) ( )
- 4. When Rana runs 50 meter in 10 seconds, her speed is 500 m/sec. ( )
- 5. If car (A) covered a distance of 100 kilometers in one hour and car (B) covered a distance of 100 kilometers in two hours so, car (B) is faster than car (A). ( )
- 6. The angle of inclination of a ramp affects the speed of an object moving on it. ( )
- 7. If two objects cover the same distance in the same time so, they have similar speed. ( )
- 8. When an object moves down on a ramp, its speed increases by decreasing the angle of inclination of the ramp. ( )
- 9. When two similar objects move with the same speed, they have different kinetic energies. ( )

**3** Write the scientific term of each of the following :

- 1. The distance that an object travels in a certain amount of time. (.....)
- 2. The measuring unit of the speed. (.....)

**4** Correct the underlined words :

1. When the speed of an object increases, its kinetic energy decreases. (.....)
2. When the angle of inclination of a ramp increases, the speed and kinetic energy of an object moves down on it decreases. (.....)
3. When an object moves at a very high speed, it has a small amount of kinetic energy. (.....)

**5** Complete the following sentences :

- 1. When the speed of a car increases, its ..... energy increases. (Suez 2023)
- 2. A car with speed = 60 km/hr, its kinetic energy is ..... than that of another car with speed = 40 km/hr, if they have the same mass.
- 3. A train that travels 150 kilometers per hour is ..... than another train that travels 100 kilometers per hour.
- 4. The speed depends on the distance that is measured in kilometers or ..... and the time that is measured in ..... or .....
- 5. A car covers 80 meters in 4 seconds, so it moves at a speed equals ..... m/sec.
- 6. If the kinetic energy of a moving body decreases, its speed will .....
- 7. If the angle of inclination decreases, the speed of an object moves down on it will .....

**6** Give reasons for :

- The speed of a truck is more than that of a small car when both of them roll down on the same ramp.
- .....  
.....

**7** What happens if ... ?

1. The speed of a car increases. (Giza 2023) (according to its kinetic energy)
- .....  
.....

2. We increase the angle of inclination of a ramp on which a toy car moves. (according to the speed of the toy car).
- .....  
.....

**8** Look at the opposite photos then answer the questions below :

1. Which one of the two animals has greater kinetic energy (rabbit or tortoise) ? (Give a reason for your answer).
- .....  
.....



Speed = 40 km/hr.

2. If the speed of the rabbit decreases, so its kinetic energy will ..... (Complete).



Speed = 1 km/hr.

- 9** Find the speed of a runner, if you know that he covers 400 meters in 80 seconds.

(Giza 2022)

.....  
.....  
.....

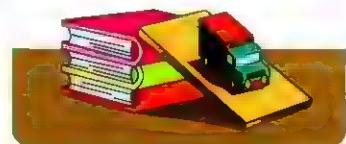
- 10** A train travels from Cairo to Alexandria in a distance of 200 kilometers in 2 hours. Find its speed.

(Cairo 2023 / Minia 2022)

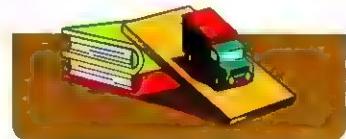
.....  
.....  
.....

- 11** Look at the opposite figures that show a toy truck moves down two different ramps, then answer the questions below :

1. Which ramp makes the truck has more speed ?  
(Give a reason for your answer).



Ramp (A)



Ramp (B)

2. What happens to the speed of the truck when increasing the angle of inclination of ramp (B) ?

.....

# LESSON THREE

## Activity 6 Energy and Collisions

► Look at this picture, then put (✓) or (✗) :

1. Before collision the moving car has a potential energy as it is running on the street. ( )
2. During collision between two objects, there is no change of energy occur. ( )



- In this activity we will learn the effect of collision on energy transfer.

### Energy and collisions :

- When you and your friend crash with each other, we can say a **collision** happens between both of you.

#### Collision:

It is the bumping or crashing of two objects into each other.

#### When two objects collide with each other :

- An amount of energy transfers between them.
- Changes of energy occur.

### Example of collision between two objects :

What happens if you are running down the street without looking in front of you and hit a traffic sign post ?

► In this situation :

- You will stop moving forward.
- You may bounce off and get hurt.
- The traffic sign post may vibrate.



► In the previous example, what are the changes and transfer of energy that take place ?

- The kinetic energy transfers from your body to the traffic sign post. This leads to the vibration of the traffic sign post.
- A part of your kinetic energy changes into a sound energy (the sound you hear on collision).



### Check your understanding

► Look at the following picture, then complete the sentences using these words :

(kinetic – collides – cart)

1. The bicycle has ..... energy as it is running on the street.
2. When the cyclist ..... with the bread cart, the kinetic energy of the bicycle transfers to the ..... and the bread, that causes the cart tips over and the bread scatters.



## Activity 7 The Effect of Speed on Collisions

- From the previous activities, you have learned that as the incline of the ramp increases, the speed of the object increases.

The amount of kinetic energy of a moving object depends on

The mass of object.

The speed of object.

- Now, we are going to study the effect of speed on collisions.
- When a fast object crash into another object, the faster object transfers some of its energy to the other object, where :

- By increasing the speed of the object, the energy that transfers during collision will increase.

- Some of this transferred energy may be in the form of heat, light or sound.



- Comparison between a fast-moving object and a slow-moving object :

Fast-moving object	Slow-moving object
<ul style="list-style-type: none"> <li>• It has more energy.</li> </ul>	<ul style="list-style-type: none"> <li>• It has less energy.</li> </ul>
<ul style="list-style-type: none"> <li>• When this object hits another object, it exerts more force.</li> </ul>	<ul style="list-style-type: none"> <li>• When this object hits another object, it exerts less force.</li> </ul>
<ul style="list-style-type: none"> <li>• This force causes a big damage to the object that cannot be repaired.</li> </ul>	<ul style="list-style-type: none"> <li>• This force causes less damage to this object than the fast-moving object.</li> </ul>



**Note**

Driving fast is very dangerous, because if a car increases its speed, its kinetic energy increases that results in exerting a large force during an accident.

## What happens if ... ?

### 1. Two cars move at different speeds in opposite directions collide with each other ?

The forces exerted in the accident depend on the speed of both cars, so **damage would be more stronger** because they move in opposite direction.



### 2. Two cars move at different speeds in the same direction collide with each other ?

The forces exerted in the accident depend on the speed of both cars, this leads to **damage that would be less strong** because they move in the same directions.



## Check your understanding

### ► Complete the following sentences :

1. The amount of kinetic energy of an object depends on both ..... and ..... of this object.
2. Fast-moving objects have ..... kinetic energy, while slow-moving objects have ..... kinetic energy.
3. By increasing the speed of an object, its kinetic energy .....

In the Assessment Book :

Try to answer :

Self-Assessment 24

# Exercises on Lesson 3

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. When the speed of a moving object increases, the energy that transfers during its collision will .....
  - a. increase.
  - b. decrease.
  - c. not change.
  - d. equal zero.
- 2. A fast-moving object has ..... that of a slow-moving object.
  - a. the same energy as
  - b. more energy than
  - c. less energy than
  - d. no energy as
- 3. The two factors affecting the kinetic energy of an object are .....
  - a. its speed and the color.
  - b. its mass and the color.
  - c. its speed and the mass.
  - d. its light and the sound energies.
- 4. As the mass of a vehicle increases, it needs ..... to .....
  - a. less force – less potential energy.
  - b. more force – more potential energy.
  - c. less force – less kinetic energy.
  - d. more force – more kinetic energy.
- 5. When two objects of the same mass move with the same speed collide with each other, the resulted damage .....
  - a. is larger in one of them and smaller in the other.
  - b. is equal in both of the two objects.
  - c. doesn't depend on the mass of the two objects.
  - d. doesn't depend on the speed of the two objects.
- 6. On collision, energy is .....
  - a. created.
  - b. destroyed.
  - c. created and transferred.
  - d. transferred and change.
- 7. When car and truck collide with each other in opposite directions, .....
  - a. the car has more energy and cause more damage.
  - b. the truck has more energy and cause more damage.
  - c. the car has less energy and cause more damage.
  - d. the truck has less energy and cause less damage.
- 8. All the following factors affect the kinetic energy of a moving car, except .....
  - a. the mass of the car.
  - b. the pushing force of the car engine.
  - c. the airbags inside the car.
  - d. the inclination of the road on which the car moves.

9. The mass of an object .....

- a. doesn't affect its potential energy or its kinetic energy.
- b. affects its potential energy and its kinetic energy.
- c. affects its potential energy only.
- d. affects its kinetic energy only.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. A heavy object that doesn't move	a. has much kinetic energy.
2. A light object that doesn't move	b. has much light energy.
3. A fast object with a heavy mass	c. if it moves with a fast speed, it has much kinetic energy.
4. A slow object with a light mass	d. has low kinetic energy.
	e. if it moves with a low speed, it has low kinetic energy.

1. .... 2. .... 3. .... 4. ....

3 Put (✓) or (✗) :

- 1. Fast-moving objects can be exposed to less damage than slow ones. ( )
- 2. A slow and light object has much kinetic energy. ( )
- 3. When you drive on high speed, the kinetic energy decreases. ( )
- 4. When two bikes collide with each other, an amount of energy transfers between them. ( )
- 5. You have to drive a car as fast as possible, because at high speeds you can avoid collisions. ( )
- 6. When you collide with an object a part of your kinetic energy may changes into sound energy. ( )
- 7. A slow-moving object has more energy and force than that of a fast-moving object. ( )
- 8. To increase the speed of a moving object, you can collide it with another object that moves in the opposite direction. ( )
- 9. When two heavy and fast cars move in opposite directions collide together, they produce very small amount of damage. ( )

**4** Write the scientific term of each of the following :

- 1. The process in which two objects bump or crash into each other, and including an energy transfer. (.....)
- 2. The energy that can be heard and usually produced when two objects collide with each other. (.....)

**5** Correct the underlined words :

- 1. By increasing the speed of the object, the energy that transfers during its collision will decrease. (.....)
- 2. When two cars collide with each other, the potential energy transfers from the faster car to the slower car. (.....)
- 3. A fast-moving object has more energy and force that cause less damage during its collision. (.....)
- 4. The effect of collision increases, when the speed of the body decreases. (.....)
- 5. Two objects of the same mass and placed at the same height, have the same kinetic energy. (.....)

**6** Complete the following sentences :

- 1. The amount of kinetic energy of a moving object depends on its ..... and its .....
- 2. During collision of two moving bikes, ..... transfers between them.
- 3. When two cars collide with each other, some of energy may change into heat , ..... and .....
- 4. The bumping or crashing of two objects into each other is called .....
- 5. When a moving car hits a tree, a part of ..... energy of the car changes into a ..... energy which you hear it.

**7** Give reasons for :

- 1. When two objects collide with each other, you can hear a sound.
- .....  
.....

- 2. Driving fast is very dangerous.
- .....  
.....

**8** What happens if ... ?

- Two bicycles move in an opposite direction, collide with each other.
- .....  
.....

**9** Look at the opposite photo, then choose the correct answer:



# LESSON FOUR

## Activity 8 Speed and Collisions

► Look at this picture which represents a toy car collides with a small ball, then choose the correct answer :



1. By increasing the speed of the car, the kinetic energy of this car .....  
(decreases – increases – doesn't change)
2. The ball moves a distance due to ..... of the car.  
(force – speed – force and speed)

► You have learned from the previous lessons that :

- 1 By increasing the force of an object The kinetic energy of this object increases.
- 2 By increasing the speed of an object The kinetic energy of this object increases.

• Now, we are going to carry out an activity to show the effect of force and speed of a moving object on its kinetic energy during collision.

### ► Tools



Ball of modeling clay



Piece of cardboard



Hard surface  
(wooden table)

Steps	Figure	Observations
<ol style="list-style-type: none"> <li>1. Use the cardboard to make a landing platform on a hard surface like a wooden table.</li> <li>2. Hold the clay ball at a distance 1 meter above the platform.</li> <li>3. Drop the clay ball lightly onto the platform without throwing it.</li> </ol>		The shape of the clay ball changes a little and becomes irregular after hitting the platform.
<ol style="list-style-type: none"> <li>4. Smoothen the clay ball over and lift it up to 1 meter above the platform, then repeat the experiment again, but this time throw the clay ball with a gentle force to increase its speed.</li> </ol>		The shape of the clay ball changes more and becomes more irregular after hitting the platform.
<ol style="list-style-type: none"> <li>5. Repeat the experiment one more time and throw the clay ball with a hard force, so its speed increases much more.</li> </ol>		The shape of the ball changes much more and becomes completely irregular after hitting the platform.

### ► Conclusions

- As the **force** on an object increases, its speed and the amount of its **kinetic energy** increase.
- As the **kinetic energy** of a moving object increases, more damage will happen to this object during collision.



### Check your understanding

#### ► Put (✓) or (✗) :

By increasing the force on an object, its speed and kinetic energy increases. ( )

## Activity 9 The Effect of Mass on Collisions

- You have learned from the previous lessons the effect of speed on collisions.
- Now, we are going to study the effect of mass on collisions.

### The relation between the mass of objects and their kinetic energy :

- Different vehicles have different masses, where a large truck has a much greater mass than a car.
- If a large truck is traveling at the same speed of a car, the truck has more kinetic energy than the car, so the truck needs a bigger engine than the car.
- As the vehicle moves faster, the amount of fuel that burns inside its engine increases to provide it with more kinetic energy.
- As the mass of an object increases, its kinetic energy increases.
- From the previous explanation, we can conclude that if the truck and the car move at the same speed, we will find that :



#### The truck :

- Has a big mass.
- Has a big engine.
- Uses more fuel.
- Has more kinetic energy.



#### The car :

- Has a small mass.
- Has a small engine.
- Uses less fuel.
- Has less kinetic energy.



**Give a reason for ...**

- The truck whose mass is 1 ton has half the kinetic energy of another truck that has mass 2 tons when they both move at the same speed.

Because if the mass of an object increases, its kinetic energy at the same speed also increases.

## The effect of mass on collisions :

- A large-mass vehicle causes more damage when it hits something than a small-mass vehicle traveling at the same speed.

### What happens if ... ?

**1. A bicycle moving at a speed of 50 km/hr hits a person.**

The bicycle will cause some injuries to this person, but he will survive.



**2. A car moving at a speed of 50 km/hr hits a person.**

The life of this person may be endangered.



### Check your understanding

► Put (✓) or (✗) :

1. A big truck has a big mass, while small car has a big engine. ( )
2. If the mass of an object increases, its kinetic energy increases. ( )

## Activity 10 Energy Conversions During a Collision

► You have learned that when two objects collide with each other, transfer and changes of energy take place such as :

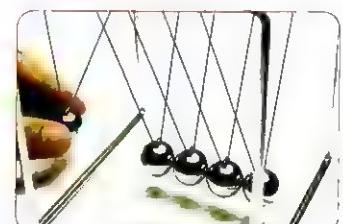
- When you play a game with marbles, kinetic energy is transferred from your hand to the first marble, then there is another transfer of energy from your marble to the ones you hit.
- Some of the kinetic energy is changed into sound energy when you hear the click sound during collisions between marbles.



### Energy conversions during a collision of Newton's cradle :

1

When Newton's cradle ball is raised up without leaving it go, it stores potential energy and doesn't have any kinetic energy.



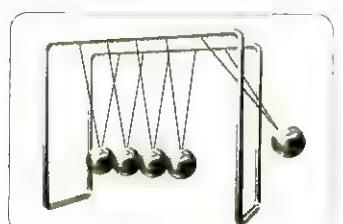
2

When you leave the ball to move in the direction of the rest balls, the potential energy decreases gradually and changes into kinetic energy.



3

Most of kinetic energy in the Newton's cradle is transferred from the first ball to the rest of balls, so the number of balls moving on both sides is equal.



► In the previous example, some of kinetic energy of the first ball is changed during collision into :

1. Sound energy	2. Thermal energy	3. Other forms of energy
Some of this kinetic energy changes into sound energy that is produced during the collision between balls.	Some of this kinetic energy changes into thermal energy that is produced due to the friction between the string and the other parts of Newton's cradle and also during collision between balls.	Some of this kinetic energy changes into other forms of energy due to the friction of air with the ball during its movement.

### Notes

- If you leave the moving balls of Newton's cradle long enough, their kinetic energy decreases gradually until they stop after lots of collisions.
- Energy is conserved during collision, so it cannot be destroyed, and the amount of energy before the collision is equal to the amount of energy after the collision.



### Check your understanding

► Look at the following picture that shows a car collides with a traffic sign post, then complete the following sentences using these words :

(thermal – sound)

- A part of energy is changed into ..... energy that you can hear.
- Another part of energy is changed into ..... energy due to friction between the car and the traffic sign post.



### Review on Concept (2.3)

To review this concept look at the Assessment Book "Part 2 : Final Revision".

### In the Assessment Book :

- Try to answer :
- Self-Assessment (25)

- Model Exam on Theme (2)

# Exercises on Lesson 4

● Understand

○ Apply

● Higher Thinking Skills

## 1 Choose the correct answer :

- 1. A very big truck needs ..... to move.
  - a. very small engine
  - b. small engine
  - c. very big engine
  - d. no engine
- 2. As the force that acts on an object increases, its ability to do work .....
  - a. increases.
  - b. decreases.
  - c. doesn't changed.
  - d. destroyed.
- 3. The amount of fuel that is used in a big truck to produce a certain amount of kinetic energy is ..... the amount of fuel in a small car to get the same amount of kinetic energy.
  - a. less than
  - b. equal to
  - c. more than
  - d. half to
- 4. On a flat road, if a large truck is traveling at the same speed of a small car, then the truck has .....
  - a. more kinetic energy.
  - b. less kinetic energy.
  - c. the same kinetic energy of the car.
  - d. no kinetic energy at all.
- 5. When a car stops, all the following become zero, except .....
  - a. speed.
  - b. kinetic energy.
  - c. mass.
  - d. work.
- 6. When a moving car decreases its speed then stops, so .....
  - a. its kinetic energy becomes zero.
  - b. its light energy only becomes zero.
  - c. its light energy and thermal energy become zero.
  - d. its kinetic energy becomes equal to its thermal energy.
- 7. If two objects collide with each other, the energy after collision is ..... the energy before collision.
  - a. triple
  - b. double
  - c. half
  - d. equal to
- 8. When two balls are pushed away at the left side of Newton's cradle, this happens as a result of collision of ..... from the right side.
  - a. one ball
  - b. two balls
  - c. three balls
  - d. four balls

- 9. In Newton's cradle, when you move a ball away from the others and not let it go, so ..... that is stored in this ball.
  - a. your potential energy is changed into kinetic energy
  - b. your kinetic energy is changed into potential energy
  - c. your sound energy is changed into kinetic energy
  - d. your sound energy is changed into potential energy
  
- 10. The kinetic energy in Newton's cradle through the balls travels in ..... at each collision.
  - a. three different directions
  - b. the same direction of movement
  - c. two opposite directions
  - d. the form of chemical energy
  
- 11. When you throw a ball of clay strongly at a wall, there is .....
  - a. no damage occurs to the ball.
  - b. more damage occurs to the ball.
  - c. energy is destroyed.
  - d. energy is created.
  
- 12. At the same speed, a large mass object has ..... than that of a small mass object.
  - a. less potential energy
  - b. more potential energy
  - c. less kinetic energy
  - d. more kinetic energy

**2** Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Large-mass vehicle with speed 100 km/hr	a. It has a big amount of kinetic energy.
2. Small-mass vehicle with speed 20 km/hr	b. It has no kinetic energy.
3. Small-mass vehicle that doesn't move	c. It has the most thermal energy. d. It has a small amount of kinetic energy.

1. ....

2. ....

3. ....

**3** Put (✓) or (✗) :

- 1. A small object moving at a low speed has a big amount of kinetic energy. ( )
- 2. The force that acts on an object doesn't affect its speed. ( )

- 3. The smaller the mass of the vehicle, the less fuel it consumes. ( )
- 4. Objects of equal masses and move at different speeds have the same kinetic energy. ( )
- 5. Speed and mass are the factors that affect the kinetic energy of a moving object. ( )
- 6. The moving balls in Newton's cradle will stop after lots of collisions because their kinetic energy is destroyed. ( )
- 7. Some kinetic energy is changed during collisions of balls in Newton's cradle, into sound and thermal energies. ( )
- 8. Among the forms of energy that don't exist in Newton's cradle during collisions are light and chemical energies. ( )

#### 4 Correct the underlined word :

1. A two-ton truck has smaller amount of kinetic energy than that of one-ton truck moving at the same speed. (.....)
2. All moving objects always have light energy. (.....)
3. The larger the mass of a car, the less fuel it consumes. (.....)
4. The distance that the balls move on the two opposite sides on Newton's cradle increases gradually as time passes. (.....)
5. In Newton's cradle, the kinetic energy of moving balls increases as time passes. (.....)
6. The number of moving balls at one side on Newton's cradle must be more than those moving at the other side. (.....)

#### 5 Complete the following sentences :

1. By increasing the force that acts on a moving object, its ..... increases that causes the increase of its ..... energy.
2. A car moving with speed 50 km/hr has ..... kinetic energy than that of a truck moving with the same speed.
3. In vehicles, the ..... energy that is stored in the fuel changes into ..... energy that allows them to move.
4. Most of ..... energy in the Newton's cradle is transferred from the first ball to the rest of balls.
5. When a marble hits another one, some of ..... energy changes into ..... energy which you can hear.
6. During collision between Newton's cradle balls, some of ..... energy changes into ..... energy due to the ..... between the string and the other parts of the cradle.
7. Due to ..... of air with Newton's cradle balls, some of ..... energy changes into other forms of energy.

- 8. In Newton's cradle, when you rise up one ball, it stores ..... energy that changes into ..... energy when you leave the ball to move.
- 9. The ..... energy decreases gradually when you leave the moving balls of Newton's cradle long enough until they .....

**6** Give reasons for :

- 1. A truck needs a bigger engine than that of a small car to move with the same speed.  
.....  
.....  
.....
- 2. A car consumes less fuel than that consumed in a bus to move at the same speed.  
.....  
.....  
.....
- 3. You can hear a sound during collision between marbles.  
.....
- 4. The amount of energy before collision is equal to the amount of energy after collision.  
.....

**7** What happens if ... ?

- 1. The pushing force that acts on an object decreases. (according to its kinetic energy).  
.....
- 2. The kinetic energy of a moving car increases.  
(according to the damage during collision).  
.....
- 3. A truck and a small car move at the same speed. (according to kinetic energy).  
.....
- 4. The Newton's cradle ball is raised up without leaving it go.  
(according to its energy).  
.....
- 5. You let the ball of Newton's cradle move towards the rest of balls.  
(according to the change of energy).  
.....
- 6. Friction occurs between the string and the other parts of Newton's cradle during collision.  
(according to the change of energy).  
.....

**8** Arrange the following sentences to show the steps of collision of Newton's cradle balls in the correct order.

- (.....) Kinetic energy is transferred from the first ball to the rest of balls.
- (.....) Potential energy of the first ball decreases and changes into kinetic energy.
- (.....) Kinetic energy of all balls decreases gradually until they stop.
- (.....) Raise up the first ball, so it stores potential energy.

**9** Look at the opposite figure, then choose

the correct answer :

1. When you push the marble, the ..... energy of your hand transfers to the marble.
  - a. sound
  - b. thermal
  - c. kinetic
  - d. potential
2. During collision between your moving marble and other marbles, some of the ..... energy of your marble changes into ..... energy.
  - a. sound – kinetic
  - b. kinetic – sound
  - c. thermal – kinetic
  - d. sound – potential
3. If a marble rolls down a ramp, the speed of the marble decreases by .....
  - a. decreasing the angle of the ramp.
  - b. increasing the angle of the ramp.
  - c. increasing the mass of the marble.
  - d. decreasing the width of the ramp.



# Model Exam 1

1

## **on Concept (2.3)**

Total mark

15

**1 (A) Choose the correct answer :**

(5 marks)



(B) Give a reason for the following :

The speed of the ball increases when the cricket bat hits it hardly.

**2 (A) Put (✓) or (✗) :**

(5 marks)

1. Some of kinetic energy of balls in Newton's cradle is changed during collisions into sound and thermal energies. ( )
  2. Speed = Time ÷ Distance. ( )
  3. After car collision, the air bags deflate as fast as they inflate. ( )
  4. In Newton's cradle as the amount of the kinetic energy increases, the moving distance of the balls increases. ( )

### (B) What happens if ... ?

Two bicycles move in opposite directions collide with each other.

**3 (A) Correct the underlined words :**

(5 marks)

1. All moving objects always have light energy. (.....)
2. Kinetic energy of an object doesn't depend on its speed which affects its potential energy. (.....)
3. The number of moving balls of Newton's cradle on one side must be more than those moving at the other side. (.....)
4. As the mass of a car increases, the damage that occurs during its collisions decreases. (.....)

**(B) Choose from column (B) what suits it in column (A) :**

(A)	(B)
1. Kinetic energy	a. form of energy that reaches the ear causing hearing.
2. Potential energy	b. type of energy transferred from one moving ball to another rest one in Newton's cradle.
3. Light energy	c. the energy that doesn't exist in Newton's cradle during collision. d. the energy stored in the first ball of Newton's cradle when you raise it up.

1. ....

2. ....

3. ....

# Model Exam 2

2

## on Concept (2.3)

Total mark

15

### 1 (A) Write the scientific term of each of the following :

(5 marks)

1. A heavy steel ball that swings on a cable and used in destruction of parts of buildings. (.....)
2. The process in which two objects bump or crash into each other including an energy transfer. (.....)
3. They are present in car airbags and allow them to deflate fast after collision. (.....)
4. The energy that can be heard and usually produced when two objects collide with each other. (.....)

### (B) Choose the correct answer :

1. When the Newton's cradle ball is raised up without leaving it go, its ..... energy is maximum and its ..... energy equals zero.

a. kinetic – potential  
c. kinetic – sound

b. potential – kinetic  
d. kinetic – thermal



2. When you leave the ball moves in the direction of the rest of balls some of kinetic energy of this ball changes into ..... and ..... energies.  
a. sound – electrical  
c. kinetic – sound  
b. thermal – kinetic  
d. sound – thermal

### 2 (A) Put (✓) or (✗) :

(5 marks)

1. A smaller and slower object has more kinetic energy than that of a larger and faster object. ( )
2. In Newton's cradle as the height of the raised ball increases, it stores more potential energy. ( )
3. When an object decreases its speed gradually, so its kinetic energy decreases gradually. ( )
4. Seatbelt is one of the safety equipment in cars. ( )

(B) Arrange the following sentences to show the steps of collision of Newton's cradle balls in the correct order :

- (.....) Potential energy of the first ball decreases and changes into kinetic energy.
- (.....) Kinetic energy is transferred from the first ball to the rest of balls.
- (.....) Rise up the first ball, so it stores potential energy.
- (.....) Kinetic energy of all balls decreases gradually until they stop.

**3** (A) Complete the following sentences :

(5 marks)

1. When a moving car hits a tree, a part of ..... energy of the car changes into a ..... energy which you hear it.
2. A car covers 80 meters in 4 seconds, so it moves at a speed equals ..... m/sec.
3. If the mass of a moving object decreases, its kinetic energy will ..... at the same speed.
4. During a car crash, the ..... is inflated with a gas to provide a soft cushion.

(B) Give a reason for the following :

If two vehicles moves at the same speed, the vehicle with a large mass causes more damage than the vehicle with a small mass during collision.

.....  
.....



EL-MOASSER

SERIES

# SCIENCE

Assessment Book

by A Group of Supervisors



4<sup>th</sup>  
Primary  
2024  
FIRST TERM

# This Assessment Book

## Includes Three Parts

1  
Part

### Self-Assessments :

(Page 3)

#### Include :

- Cumulative self-assessments on lessons of each concept.
- Cumulative model exam on concepts.
- A model exam on each theme.



2  
Part

### Final Revision :

(Page 49)

#### Includes :

Review on each concept.



3  
Part

### Final Examinations :

(Page 84)

#### Include :

- El-Moasser final examination models.
- Final examinations of some governates



4  
Part

### Projects

(Page 115)

#### Include :

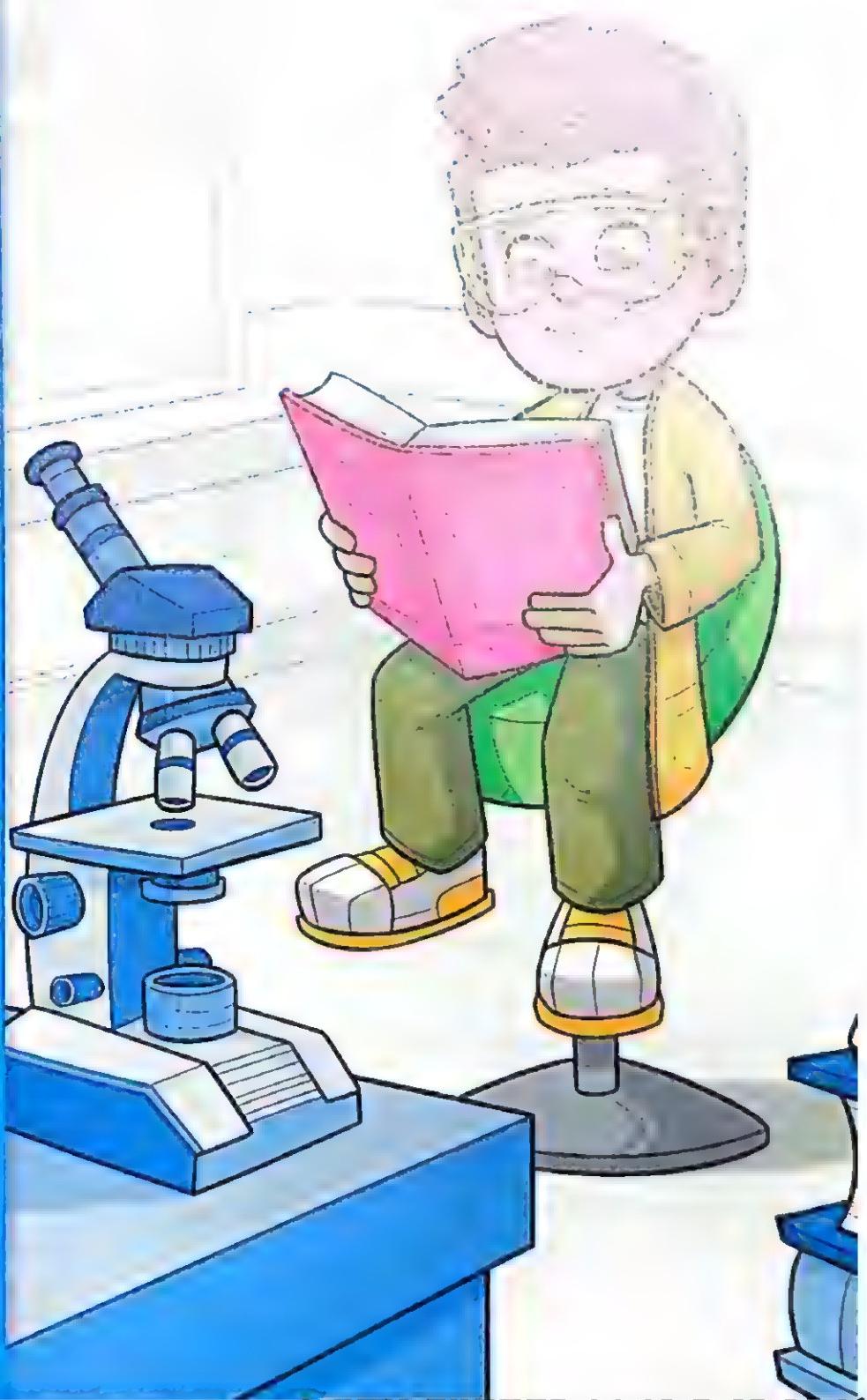
- Unit one project.
- Interdisciplinary project.
- Unit two project.



## SELF-ASSESSMENTS

1

PART



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of Part One

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### UNIT ONE : Living Systems

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# Self-Assessments

## on Concept (1.1)

### Self-Assessment 1

On Level

#### (A) Choose the correct answer :

1. Which of the following statements is correct ?
  - a. Starred agama lizard live in extreme cold weather.
  - b. Penguins have no feathers on their feet.
  - c. Forest bears blend in with snow through their white fur.
  - d. Caracals have colorful scales to adapt their desert landscapes.
2. The different colors of fur in different types of bears help them to
  - a. respire in their environments.
  - b. adapt their habitats.
  - c. communicate with other animals.
  - d. look for shade areas.
3. Which of the following sentences doesn't represent the camouflage adaptation ? .....
  - a. Dense feathers of penguins.
  - b. White fur of polar bears.
  - c. Colored scales of some lizards.
  - d. Sandy-colored fur of fennec foxes.

#### (B) Give a reason for the following :

Some types of lizards that live in rocky areas have colorful scales.

.....

.....

.....

#### (2) (A) Put (✓) or (✗) :

1. Bodies of fennec foxes, penguins and caracals are adapted to live in extreme hot climate. ( )
2. Penguins have special blood vessels in their feet that help them survive in polar regions. ( )
3. The brown fur of the polar bear helps it to blend in with snow. ( )

#### (B) What happens if ...?

Forest bears are coated with white fur.

.....

.....

**3** Look at the opposite figures, then answer the questions below :

1. Which figure shows the correct structure of blood vessels in the penguin's feet ?

.....  
2. What would happen if the penguin has the structure of blood vessels shown in figure (a) ?



Figure (a)

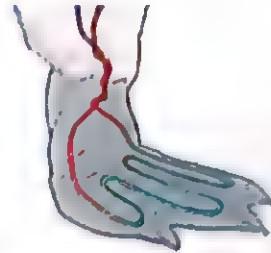


Figure (b)

**Self-Assessment 2**

**1 (A) Complete the following sentences :**

- White fur of polar bear is considered as ..... adaptation, while the panting in fennec fox is considered as ..... adaptation.
- Chameleon puffs up its body with air for defense which is considered as ..... adaptation, while its V-shaped feet is considered as ..... adaptation.
- The leaves of ..... tree grow and gather on the top of its trunk to prevent animals from eating them, while the leaves of ..... tree are hand-shaped leaves.

**(B) What happens if ...?**

Bull shark has white back and dark belly.

**2 (A) Correct the underlined words :**

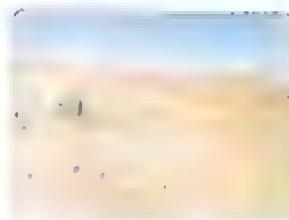
- Polar bear has white fur that helps it blend in with the snow as it sneaks up on its predator. (.....)
- Bull shark can live in salt water only. (.....)
- Water lily has wide leaves to absorb a large amount of water. (.....)

**(B) Give a reason for the following :**

The shape of pine tree leaves is like a needle.

**3** Look at the opposite figure, then answer the following questions :

1. Give two examples of animals that live in this habitat.



2. Give two examples of plants that live in this habitat.

3. Put (✓) or (✗) :

1. Plants of this habitat are characterized by having long thick roots. ( )

2. Plants of this habitat have large wide leaves. ( )

**Self-Assessment 3**

**1 (A) Choose the correct answer :**

1. The trunk in acacia tree stores ..... as the hump in the camel stores

- a. oil, water.      b. water, milk.      c. oil, milk.      d. water, fat.

2. All of the following sentences are correct about stomach, except .....

- a. it has teeth and tongue.
- b. it receives the food from esophagus.
- c. food changes into soupy liquid inside it.
- d. it contains an acid.

3. All of the following organs belong to the respiratory system, except .....

- a. nose.      b. two bronchi.      c. two lungs.      d. stomach.

**(B) Give a reason for the following :**

Saliva is very important in your mouth.

**2 (A) Put (✓) or (✗) :**

1. Caracal and fennec fox can hide in the desert as they have white-colored fur. ( )

2. Bodies of starred agama and panther chameleon are covered with scales. ( )

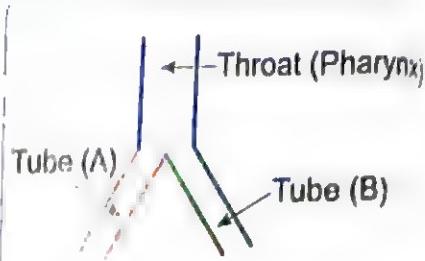
3. Digestion process begins in the stomach with the help of saliva. ( )

**(B) What happens if ...?**

The small intestine was not supplied with blood vessels in the human body.

**3** Study the opposite diagram, then answer the questions. Knowing that through tube (A) air passes, while through tube (B) food passes :

1. Tube (A) represents the .....
2. Tube (B) represents the .....
3. Tube (A) connects throat to the .....
4. Tube (B) connects throat to the .....
5. Tube (A) belongs to ..... system, while tube (B) belongs to ..... system.



### Self-Assessment 4

**1** (A) Choose the correct answer :

1. Air is important for human, fish and animals because .. .....
  - a. it contains carbon dioxide gas that is important for breathing.
  - b. it contains carbon dioxide gas that is important for digestion.
  - c. it contains oxygen gas that is important for breathing.
  - d. it contains oxygen gas that is important for digestion.
2. Cutting down rainforests, may help human to make furniture, but also may cause disappearance of .....
 

a. starred agama,	b. bull shark.
c. panther chameleon.	d. polar bear.
3. All of the following living organisms need food and can get oxygen gas from air to obtain energy, except .....
 

a. fennec fox.	b. bull sharks.	c. pine trees.	d. humans.
----------------	-----------------	----------------	------------

(B) Give a reason for the following :

Air pollution is dangerous for humans, while water pollution is dangerous for fish and humans.

.....

.....

**2** (A) Put (✓) or (✗) :

1. Human can pollute the environment, but he cannot restore it. ( )
2. Both lungs and gills are organs that present in the digestive system of both human and fish. ( )
3. When an ecosystem is completely polluted, no longer organisms can live in it. ( )

(B) Write one animal and one plant that live in each environment of the following :

Environment	Animal	Plant
1. Desert :	.....	.....
2. Rainforest :	.....	.....
3. Polar region :	.....	.....
4. Salt water :	.....	.....

3 Give only one example of structural adaptation in each of the following :

1. Acacia tree : .....

2. Fish : .....

3. Polar bear : .....

### Self-Assessment ( 5 till Lesson 5

1 (A) Cross out the odd word :

1. Frog – Starred agama lizard – Salamander – Toad. (.....)
2. Water lily – Fish – Palm tree – Amphibian. (.....)
3. Golden frog – Panther chameleon – Kapok tree – Acacia tree. (.....)

(B) Give a reason for the following :

Amphibians are endangered species.

.....  
.....

2 (A) Write the scientific term of each of the following :

1. A type of living organisms that can breathe in air and in water. (.....)
2. An organ with structural adaptation that enables toad to breathe in water. (.....)
3. The grassland habitat of acacia tree, in which we cannot find amphibians during dry seasons. (.....)

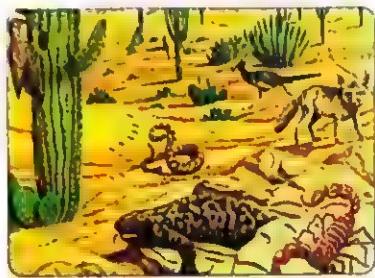
(B) If you are one of the scientists who help amphibians survive.

You can do all of the following for their habitats, except

- removing air pollutants.
- removing water pollutants.
- removing their natural predators.
- removing water from ponds and streams.

(Give a reason for your choice)

3 Look at the following two pictures, then answer the questions (by writing habitat (A) or habitat (B)) :



Habitat (A)



Habitat (B)

- Starred agama lizard and fennec fox live in .....
- We can find panther chameleon in .....
- Amphibians cannot live in .....
- Yellow body coats is most common in .....
- Dry seasons is more dangerous for .....
- Cutting down forest usually occurs in .....
- The suitable ecosystem for barbary fig is .....
- Caracal can live in .....
- Arctic fox cannot be found in .....
- Kapok tree can grow in .....

# Model Exam

## on Concept (1.1)

Total marks

15

1 (A) Complete the following sentences using the words below : (3 marks)

(blood vessels – expands – cool – mild)

1. A burrow is an excellent place for the fennec fox to stay ..... during the day.
2. During exhalation, the diaphragm ..... and moves upwards
3. Savannah is a grassland habitat with a ..... temperature
4. The ..... in the gills of fish carry oxygen gas to the rest of the body.

(B) Give a reason for the following :

Starred agama lizard and golden frog are two different species.

.....

.....

2 (A) Put (S) in front of structural adaptation and (B) in front of behavioral adaptation for each of the following statements : (5 marks)

1. Bull shark can hunt in salt water and fresh water. (.....)
2. Black bear has dark fur. (.....)
3. Acacia tree uses wind to send messages. (.....)
4. Blood vessels in the penguin's feet. (.....)

(B) What happens if ...?

One of the organs of the digestive system is absent.

.....

.....

3 (A) Choose from column (B) what suit them in column (A) : (5 marks)

(A) Living organism	(B) Habitat
1. Lizard	a. Land and water
2. Fish	b. Desert
3. Frog	c. Water
4. Polar bear	d. Arctic region

1. .... 2. .... 3. .... 4. ....

(B) Write the scientific term of each of the following :

1. Little air sacs surrounded by blood vessels in the respiratory system. (.....)
2. A fox that changes its fur color between winter and summer seasons. (.....)

11

# Self-Assessments

on Concept (1.2)

## Self-Assessment 6

On Page 111

### 1 (A) Complete the following sentences :

1. Dolphins use ..... property that help them to find their food.
2. Human use senses of ..... and ..... when watching a football game at television.
3. Chameleons use their ..... to see the food, while they have a very long ..... to help them catch and taste insects.

### (B) Give a reason for the following :

Dolphins can locate their preys under water.

.....  
.....  
.....

### 2 (A) Put (✓) or (✗) :

1. The owl uses the sense of touch to hunt its prey at night. ( )
2. Fox has good senses of hearing and sight so that it can avoid danger. ( )
3. A dog uses its sense of smell and sight to identify its owner. ( )

### (B) Look at the opposite figure, then answer the following questions :

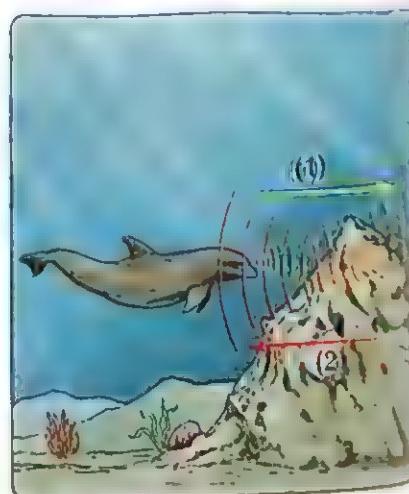
1. Mention the three senses that you use to identify the food in this picture.
- .....

2. What is the sense used to tell if this food has too much salt or not ? And which organ is responsible for it ?
- .....



### 3 Observe the following figure, then choose the correct answer :

1. Arrow number (1) represents .....
  - a. sound waves produced by the dolphin.
  - b. the echo bounced back from the rock.
  - c. light waves produced by the dolphin.
  - d. light waves produced by the rock.
2. Arrow number (2) represents .....
  - a. sound waves produced by the dolphin.
  - b. the echo bounced back to the dolphin.
  - c. light waves produced by the dolphin.
  - d. light waves bounced back to the dolphin.



3. The dolphin uses this property to . . .
- see objects under water.
  - see objects above the water surface.
  - locate objects and living organisms on the beach.
  - locate objects and living organisms under water.
4. The sense used by the dolphin in the previous picture is the . . .
- smell.
  - taste.
  - hearing.
  - sight.

### Self-Assessment 7

**1 (A) Choose the correct answer :**

- An animal that flies and depends on the bouncing of sound to catch its preys is a/an .....

  - owl.
  - snake.
  - bat.
  - dolphin.

- ..... can detect and amplify distant sounds due to their heads that look like bowls.

  - Owls
  - Dogs
  - Mongooses
  - Chameleons

- Bats and dolphins are animals that greatly different in size, but they have one thing in common as they both .....

  - live in the same environment.
  - feed on the same prey.
  - depend on echolocation property in their hunting.
  - depend on gills to breathe.

**(B) Give a reason for the following :**

The nerves spread across the whole body.

.....

.....

**2 (A) Put (✓) or (✗) :**

- A dolphin produces sound waves so it can locate its prey through echo. ( )
- The Egyptian mongoose makes a group of sounds that bounce back to it when it hits a wall or its prey. ( )
- Nocturnal animals become active at morning to look for their food. ( )

**(B) What happens if ...?**

The hind legs of jerboa are short.

.....

.....

**3** Correct the underlined words :

1. Nerves are important parts of the digestive system. (.....)
2. The jerboa's reaction is very slow. (.....)
3. The bat can rotate its head in all directions. (.....)

**Self-Assessment 8 till Lesson****1 (A) Write the scientific term of each of the following :**

1. The organ which receives and processes the messages sent from the sensory receptors that are found in a jerboa's ears. (.....)
2. A system that works inside the body to keep the organism away from danger. (.....)
3. The time taken by an organism's body to react to different information around it. (.....)

**(B) What happens if ...?**

The bat produces sound waves that hit an insect.

.....

**2 (A) Choose the correct answer :**

1. The nervous system of....., such as elephants and dogs, consists of brain, spinal cord and nerves.  
a. rodents      b. birds      c. mammals      d. reptiles
2. ..... are nocturnal animals with bowl-shaped faces.  
a. Owls      b. Dogs      c. Mongooses      d. Chameleons
3. If you are in your room, you can tell what kind of food is being prepared in the kitchen by using your sense of .....  
a. sight.      b. hearing.      c. touch.      d. smell.

**(B) Give a reason for the following :**

Dolphins have sharp sensory organs.

.....

.....

**3 Order the following statements that illustrate how the rabbit's brain processes running away from the fox before predating it :**

- (.....) The rabbit's brain processes information.
- (.....) The rabbit's nerves sent a signal to the brain.
- (.....) The rabbit's brain sent a signal to its feet muscles to escape.
- (.....) The rabbit saw a fox moving towards it to devour it.



**Full Answer Guide**

9

Full Answer Guide

**1 (A) Choose the correct answer :**

1. In an animal, if the reaction time is very long, so that the animal
  - a. will survive.
  - b. will reproduce
  - c. will be at risk of extinction.
  - d. will run away quickly
2. The nervous system plays an important role in
  - a. obtaining energy from food.
  - b. obtaining energy from oxygen.
  - c. absorbing food from small intestine.
  - d. responding to different stimuli.
3. If the sensory receptors in the tongue are damaged completely this will affect our ability to taste food will .....
  - a. increase.
  - b. disappear.
  - c. decrease.
  - d. not change

**(B) Give a reason for the following :**

An owl can detect and amplify distant sounds and direct them to its ears.

.....

.....

**2 (A) Correct the underlined words :**

1. Humpback whales produce low-pitched sound in mating season. (.....)
2. The soldier ants defend their community depending on their hearing sense. (.....)
3. The bats depend on echolocation to find insects at night and that is considered as a behavioral adaptation. (.....)

**(B) What happens if ...?**

The cane of a blind person picks up echo.

.....

**3 Place each of the following animals in front of the sentence that describes it :**

(Dolphins – Owls – Jerboas – Bats)

1. They can fly but cannot see well in the dark. (.....)
2. They are rodents that have long hind legs. (.....)
3. They are nocturnal birds with bowl-shaped faces. (.....)
4. They live in water and rely on echolocation to find food. (.....)

# Model Exam

## on Concepts (1.1) & (1.2)

Total mark

15

**1** (A) Put (✓) or (✗) :

(5 marks)

1. Hand-shaped leaves of kapok tree is considered as a structural adaptation. ( )
2. Humpback whales produce high-pitched sound in summer. ( )
3. Amphibians include frogs, starred agama and salamanders. ( )
4. The brain can process what we hear from our environment. ( )

**(B) Cross out the odd word :**

1. Nerves – Small intestine – Brain – Spinal cord. (.....)
2. Stomach – Diaphragm – Esophagus – Large intestine. (.....)

**2** (A) Choose from columns (B) and (C) what suit them in column (A) :

(5 marks)

(A) Living organism	(B) Species	(C) Habitat
1. Bull shark	a. Reptile	A. Savannah
2. Starred agama	b. Amphibian	B. Salt and fresh water
3. Acacia	c. Fish	C. Wet environment
4. Frog	d. Plant	D. Desert environment

1. .... → .....      2. .... → .....      3. .... → .....      4. .... → .....

**(B) Give a reason for the following :**

The nurse ants send smelly message to scout ants.

.....

**3** (A) Complete the following sentences using the words below :

(5 marks)

(penguin – reflex – reaction time – oxygen gas)

1. Moving your hand away when touching a very hot cup of tea is called .....
2. Living organisms need food and ..... to obtain energy.
3. Among animals that can live in polar environment are ..... and polar bear.
4. The time taken by a boy to move quickly his hand away, when he touches the spines of a cactus plant is called .....

**(B) Correct the underlined words :**

1. Fish use lungs to take oxygen out of the water. (.....)
2. The scout ants use smelly message to communicate if there is danger nearby. (.....)

# Self-Assessments

## on Concept (1.3)

### Self-Assessment (10 On Lesson 1)

#### 1 (A) Put (✓) or (✗) :

1. Eyes send information through nerves to the brain for processing them. ( )
2. The membrane that presents at the back of cat's eyes depends on sound to detect the prey location. ( )
3. Fishing cat has excellent night vision better than human. ( )

#### (B) Give a reason for the following :

The fishing cat's eyes pupils open widely at the low-light places.

#### 2 (A) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Fishing cat	a. depends on touch to hunt.
2. Human	b. has no mirror-like membrane at the back of the eye c. has a mirror-like membrane at the back of the eye.

1. ....

2. ....

#### (B) Give a reason for the following :

We can see the moon shining although it is not a source of light.

#### 3 Choose the correct answer :

1. If the human eyes contain a mirror-like membrane like which is found in fishing cat's eyes, then all the following statements are correct, except that human eyes .....  
a. seem to glow at night.  
b. have excellent night vision.  
c. don't need night vision goggles.  
d. need a strong source of light to can see at night.
2. In the low-light places, cat's eyes pupils open ..... human's eyes pupils.  
a. equal to      b. smaller than    c. narrower than    d. wider than
3. Which of the following animals has the ability to fly but can't see clearly at night ?  
.....  
a. Fishing cat.    b. Snake.                c. Bat.                d. Fennec fox.

4. All the following have structural adaptation in their eyes, except
- owls.
  - fishing cats.
  - panther chameleons.
  - bats.

### Self-Assessment (11 till Lesson 1)

**1** (A) Put (✓) or (✗) :

- You can see a green ball inside a transparent glass box. ( )
- Opaque objects allow light to pass through and we can see objects through them. ( )
- In a completely dark room, we can see the transparent objects but opaque objects cannot be seen. ( )

(B) Give a reason for the following :

You can see clearly through air.

.....

**2** (A) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Water	a. It is an opaque material, that reflects light in different directions.
2. Glass	b. It is a source of light energy.
3. Wood	c. It is a transparent material that is used in making windows. d. It is a transparent liquid material.

1. ....

2. ....

3. ....

(B) Cross out the odd word :

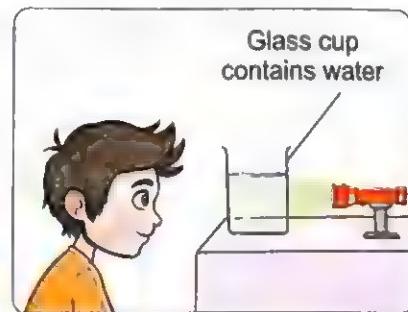
- Mirror – Cloth – Paper – Wood sheet. (.....)
- Wood door – Book – Wall – Glass cup. (.....)

**3** Look at the opposite figure, then answer the questions below :

1. Can you see the light from the other side of cup ?
- .....

2. From this activity, we can conclude that .....

- water and glass are opaque objects.
- water and glass are transparent objects.
- water is an opaque object, while glass is a transparent one.
- glass is an opaque object, while water is a transparent one.



**1 (A) Put (✓) or (✗) :**

1. Firefly beetles form different flash patterns by using their legs.
2. Speaking is one of the ways to communicate with people.
3. Light energy not used by humans or firefly beetles for communication.

**(B) Give a reason for the following :**

The wings of firefly beetles play an important role in firefly communication between them.

.....

.....

**2 (A) Correct the underlined words :**

1. Changing the flash patterns of firefly beetles is considered as a structural adaptation.
2. A cell phone is a device that is used in communication between animals.
3. Reading is a type of communication that depends on the sense of taste.

**(B) How can firefly insects produce light to communicate with each other ?**

.....

.....

**3 Choose the correct answer :**

1. .... is a type of communication which is used by humans only.  
a. Sound      b. Light      c. Echolocation      d. Cell phone
2. Which of the following is not a reason for firefly beetles produce a flash light ?  
.....  
a. To attract a mate.      b. For communication.  
c. To warn off from predators.      d. To hear in the dark.
3. .... is considered a type of communication used by animals only.  
a. Writing      b. Echolocation      c. Reading      d. Cell phone
4. A firefly is not a bird, but it is a type of .....  
a. amphibians.      b. lizards.      c. beetles.      d. reptiles.

**Self-Assessment 13 till Lesson 4****1 (A) Choose the correct answer :**

1. All of the following use light energy to send codes, except ..... .
  - a. lighthouses.
  - b. traffic lights.
  - c. musical instruments.
  - d. firefly beetles.
  
2. Some living organisms can use light energy in communication such as ..... .
  - a. humans only.
  - b. firefly beetles only.
  - c. humans and firefly beetles.
  - d. bats and firefly beetles.
  
3. The ..... is the only living organism that can use language and speech to communicate with each other.
  - a. whale
  - b. owl
  - c. firefly beetles
  - d. human

**(B) Give a reason for the following :**

In cats' eyes the mirror-like membrane cannot make its function in a completely dark room.

.....

**2 (A) Put (✓) or (✗) :**

1. People who are lost in the desert can use mirrors to attract the attention of rescue helicopters.. ( )
2. Writing is a type of communication that is used by human only. ( )
3. Musical instruments cannot be used to send codes for communication. ( )

**(B) What happens if ... ?**

The structure of fishing cat's eyes are like that of human's eyes.

.....

**3 Complete the following table using the words below :**

(communicate - eyes - flash patterns - light reflection - bodies - hunt - chemical reaction - mirror - like membrane)

Fishing cats	Firefly beetles
1. There is a special structure known as a ..... presents at the back of their .....	1. They produce light, due to the occurrence of a ..... inside their .....
2. The special structure of sight causes ..... to collect more light, and helps them to ..... at night.	2. They use their wings to form different ..... that help them to ..... at night.

# Model Exam

## on Theme 1

Total mark

15

### 1 (A) Choose the correct answer :

1. The light travels in ..... lines.  
a. circular      b. straight      c. zigzag      d. curved
2. An animal that flies and depends on the bouncing of sound to catch its prey, is a/an .....  
a. owl.      b. snake.      c. bat.      d. dolphin
3. The throat is connected to the stomach through .....  
a. esophagus.      b. trachea.      c. small intestine.      d. anus.
4. Barbary fig keeps animals away like acacia trees by its  
a. long leaves.      b. smell.      c. sharp spines.      d. poison.

### (B) Give reason for the following :

Firefly beetles can produce flash patterns.

.....

.....

### 2 (A) Put (✓) or (✗) :

1. Both of fishing cats and humans have a good night vision. ( )
2. Penguin's body is covered with dense feathers and a thick layer of fat to keep its body warm. ( )
3. The scout ants use smelly message to communicate if there is danger nearby. ( )
4. Salamanders and fish can breath in air through lungs. ( )

### (B) What happens if ... ?

The hind legs of jerboa are short.

.....

.....

### 3 (A) Complete the following sentences :

(5 marks)

1. Fishing cats have a mirror-like membrane at the back of their .....
2. A burrow is an excellent place for the ..... fox to stay warm at night.
3. The kapok tree spreads smell of its flowers to attract ..... towards it.
4. Humpback whales produce low-pitched sound in ..... season.

(B) Using the following table, mention the name of the tube-shaped organs of the digestive and respiratory system our bodies :

(A)	(B)
Organ (1) .....	through which food passes to the stomach.
Organ (2) .....	in which the absorption of nutrients takes place.
Organ (3) .....	it ends with anus.
Organ (4) .....	it connects the throat with the two lungs.

# Assess your Learning

**Q**( $\{x_1, x_2, \dots, x_n\}$ ) =  $\{x_1^2, x_2^2, \dots, x_n^2\}$  (Square function)  $\{x_1^3, x_2^3, \dots, x_n^3\}$  (Cubic function)

**1 Choose the correct answer :**

1. .... is considered as a behavioral adaptation in living organisms.

  - a. Long ears
  - b. Living in burrows
  - c. Big eyes
  - d. Countershading

2. .... is considered as a structural adaptation in living organisms.

  - a. Birds migration
  - b. Panting
  - c. Brown fur
  - d. Puffing up the body to appear bigger

3. The following animals are structurally adapted to live in polar regions, except .....

  - a. penguin.
  - b. fennec fox.
  - c. arctic fox.
  - d. polar bear.

4. Some plants have very wide leaves in order to .....

  - a. prevent their tearing off due to wind.
  - b. prevent animals from eating them.
  - c. reduce water loss.
  - d. get more sunlight.

5. Which of the following groups reflects light well when it falls on them? .....

  - a. Mirror – Wooden board – Metal spoon.
  - b. Metal spoon – Cardboard box – Mirror.
  - c. Mirror – Aluminum foil – Metal spoon.
  - d. Aluminum foil – Bricks – Mirror.

6. The feature of light .... helps to see yourself in the mirror.

  - a. refraction
  - b. reflection
  - c. absorption
  - d. density

7. When exposing to danger, the ..... system helps to recognize it and avoid it.

  - a. circulatory
  - b. digestive
  - c. respiratory
  - d. nervous

## **2 Compare between each of the following :**

1. The inhaled air and the exhaled air during the breathing process of a person.  
.....
  2. Structural adaptation and behavioral adaptation of a living organism.  
.....
  3. Communication in humans and communication in animals.

**3** Put (✓) or (✗) :

1. The stomach is an important organ in the digestive system. ( )
2. Your sense of hearing allows you to see the light of a flashlight. ( )
3. The esophagus is an important organ in the respiratory system. ( )
4. Your sense of touch allows you to feel the heat of a stove. ( )
5. The lungs are important organs in the respiratory system. ( )
6. The ear is the organ of feeling that allows you to hear birds singing. ( )
7. The heart is an important organ in the nervous system. ( )
8. The eye is the organ of feeling that allows you to taste the bitterness of a lemon. ( )
9. The diaphragm is an important organ in the digestive system. ( )
10. Skin is the sensory organ that allows you to feel the softness of the fabric. ( )

**4** Complete the sentences using the correct words from the following words in brackets :

(touch – hearing – light – eye – ear – heart – brain – respiratory – system – lung – stomach – digestive system)

1. The sense of ..... allows you to notice noise.
2. The ..... sends a signal through the nerves, the signal goes to the ....., and you interpret that sound as the song of a bird.
3. The system that digests food to produce energy is the ..... and one of the most important organs in this system is the ....., while the system that is responsible for providing the body with oxygen is the .....

**5** Answer the following questions :

1. Why does night vision differ between cats and humans ?

.....  
.....

2. Bats cannot see in the dark, but they can hunt their preys at night.

(Give a reason)

.....  
.....

# Self-Assessments

on Concept (2.1)

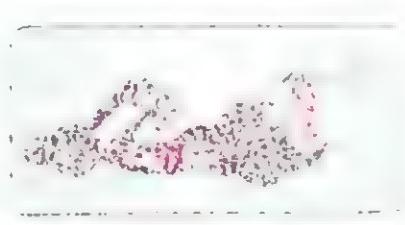
Self-Assessment 14

1 (A) Put (✓) or (✗) :

1. The engine of a normal truck is the same engine of a rocket ( )
2. Engineers use the same idea of rocket design in stopping the Shockwave truck ( )
3. You need energy to make a force to move a chair from one place to another ( )

(B) Give a reason for the following :

By increasing the number of fire extinguishers,  
the distance that the cart moves will increase.



2 (A) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Normal engine	a. is used in stopping both of the Shockwave truck and rockets.
2. Jet engine	b. is used in moving a normal truck.
3. Parachute	c. is used to stop a normal truck. d. is used in moving the Shockwave truck.

1. ....

2. ....

3. ....

(B) Which is faster, a normal truck or the Shockwave truck ?

(Give a reason for your answer).

.....

3 This picture represents one of the most powerful and fastest trucks in the world :

1. What is the name of this truck ?

.....

2. What happens if the three jet engines of this truck  
are replaced by the engine of a normal truck ?



## Self-Assessment 15 till Lesson 2

**1 (A) Choose the correct answer :**

1. A book is placed on a table is affected by .....  
 a. gravity pulling force only.  
 b. table pushing force only.  
 c. table pulling force and gravity pushing force.  
 d. table pushing force and gravity pulling force.
2. When you sit on a chair which of the following sentences is correct ? .....  
 a. gravity pulling you upward.  
 b. gravity pulling you downward.  
 c. chair pulling you upward.  
 d. chair pushing you downward.
3. We can see all the following motions, except .....  
 a. the rotation of Earth around the Sun.  
 b. a person crossing the road.  
 c. a person riding a bicycle.  
 d. a person swimming in the sea.

**(B) What happens if ... ?**

The pulling force of one of the two teams in tug-of-war game becomes greater than the other team.

.....

.....

.....

**2 (A) Correct the underlined words :**

1. To move up any object from the ground, the pulling force of your hand must be smaller than the pulling force of the gravity. (.....)
2. In tug-of-war game, the winner team is the team with the weaker force. (.....)
3. You can stop the ball that is thrown toward you by the pulling force of your hands against the ball movement. (.....)

**(B) Give a reason for the following :**

Parachutes are used in the Shockwave truck and rocket .

.....

**3** Look at the following pictures, then choose the correct answer :



Picture (1)



Picture (2)

1. In picture (1) the force(s) that the football player uses to move the ball is/are .....
  - a. pushing force only.
  - b. pulling force only.
  - c. both pushing and pulling forces.
  - d. neither pushing nor pulling force.
  
2. The force(s) used in picture (2) is/are .....
  - a. pushing force only.
  - b. pulling force only.
  - c. both pushing and pulling forces.
  - d. neither pushing nor pulling force
  
3. The winner group in the game in picture (2) is the group that has force ..... than that of the loser team.
  - a. more than
  - b. less than
  - c. equals to
  - d. weaker than

### Self-Assessment 16 till Lesson 3

**1** (A) Complete the following sentences :

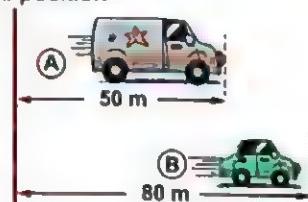
1. There are two forces act on any object stands on a table which are the ..... force of the table and the ..... force of the gravity.
2. You cannot lift up a bag from the ground if the pulling force of your hand and the pulling force of gravity are .....
3. When you stop pedalling during the movement of the bicycle, its speed decreases gradually until it stops, due to the effect of ..... force.

(B) In the opposite figure, if we affect on these two toy cars by the same force :

Why the car (B) moves for a longer distance than the car (A) ?

.....  
.....

Original position



**2** (A) Put (✓) or (✗) :

1. The Shockwave truck has only one jet engine that makes it faster than the normal truck. ( )
2. The reason for stopping a toy car moves on a table is the friction between the toy car and the table surface. ( )
3. We can stop the motion of the Shockwave truck by using parachutes. ( )

**(B) What happens if ...?**

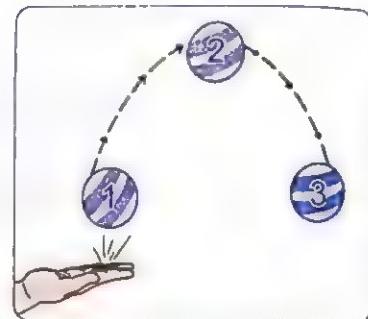
A toy car and a toy truck are affected by the same pushing force.

.....

.....

**3** Look at the opposite figure that shows the movement of a ball pushed up with your hand, then answer the questions :**(A) Put (✓) or (✗) :**

1. The ball moves from point (1) to point (2) due to the hand pulling force. ( )
2. The ball moves from point (2) to point (3) due to the gravity pulling force. ( )
3. At all points, the ball is affected by the friction force of the air. ( )

**(B) Complete the following sentence :**

The ball moves from point ..... to point ..... in a direction opposite to the direction of the gravity.

**Self-Assessment 17 till Lesson 4**
**1** (A) Choose the correct answer :

1. When a toy car moves faster than a toy truck, this means that the toy car do work ..... that of the toy truck.
  - a. more than
  - b. less than
  - c. equal to
  - d. half to

2. The reason for stopping a toy car crashes the wall is the
- pushing force of wall in the opposite direction of the car movement.
  - pushing force of wall in the same direction of the car movement.
  - pulling force of wall in the opposite direction of the car movement.
  - pulling force of wall in the same direction of the car movement.
3. In tug-of-war game, if the first group contains three children, while the second group contains nine children, this means that the forces act on the rope are ..... of each other.
- balanced in opposite directions
  - unbalanced in opposite directions
  - balanced in the same direction
  - unbalanced in the same direction

**(B) Give a reason for the following :**

Any body moves on the ground is usually affected by a force opposes its direction of movement.

.....

.....

**2 (A) Correct the underlined words :**

- The reason for standing of a cup on a table is that the pushing force of the table is more than the pulling force of gravity. (.....)
- The work done by the football is always less than the amount of energy transferred from the player foot to the ball. (.....)
- If the same force is applied on a large ball and a small ball, the large ball moves a distance longer than the small ball. (.....)

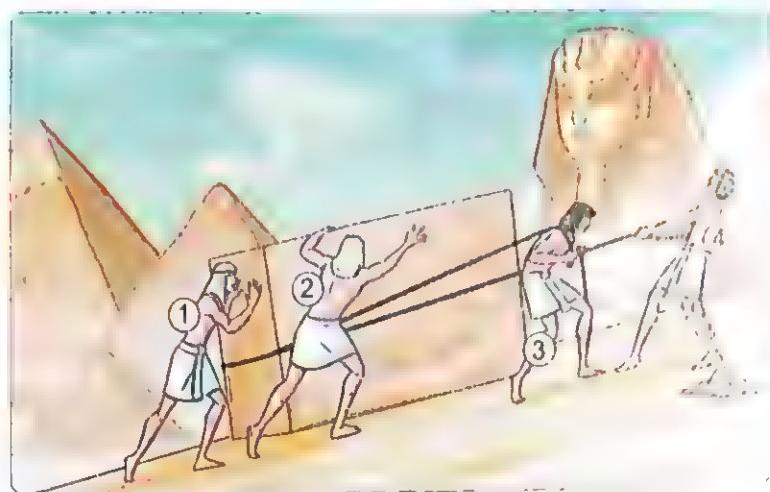
**(B) Give a reason for the following :**

When you let the ball out of your hand, it falls to the ground.

.....

.....

3 The pharaohs built the pyramids, and this work took many years of work :



(A) Find out from the picture :

1. Two persons pull the heavy stone. (.....)
2. Two persons push the heavy stone. (.....)
3. The type of force between the stone and the ground. (.....)

(B) Put (✓) or (✗) :

1. If the large stone moves from its place, this means that there are balanced forces acting on it. ( )
2. Big stones need more force to move them than smaller ones. ( )
3. The work done is equal to the amount of energy transferred by a force that is used to move the stone. ( )

# Model Exam

On Concepts (3rd)

15

## 1 (A) Choose the correct answer :

1. Which of the following do you use to kick a ball with your leg?  
a. Pull force.      b. Push force      c. Sound energy      d. Light energy
2. When an object is in motion, this means that its ... changes.  
a. color      b. shape      c. position      d. size
3. Which of the following will cause an object to move?  
a. Balanced forces.      b. Unbalanced forces  
c. Sound energy.      d. Light energy
4. Which sentence represents the best example of gravity?  
a. A car hits a tree, and its motion stops.  
b. A wind blows, and a sailboat moves.  
c. A book is pushed, and it moves across a table.  
d. A person drops a ball, and it falls to the ground.

## (B) What happens if ... ?

The Shockwave driver opens the parachutes.

.....

.....

## 2 (A) Put (✓) or (✗) :

(5 marks)

1. Lifting a book upward needs more energy than pushing a truck. ( )
2. You need energy to push a car forward or backward. ( )
3. Using a remote control of television needs a pushing force that acts on its buttons. ( )
4. When a car crashes into a wall, it will not stop. ( )

## (B) Give a reason for the following :

The Shockwave truck is faster than the normal truck.

.....

.....

## 3 (A) Complete the following sentences :

(5 marks)

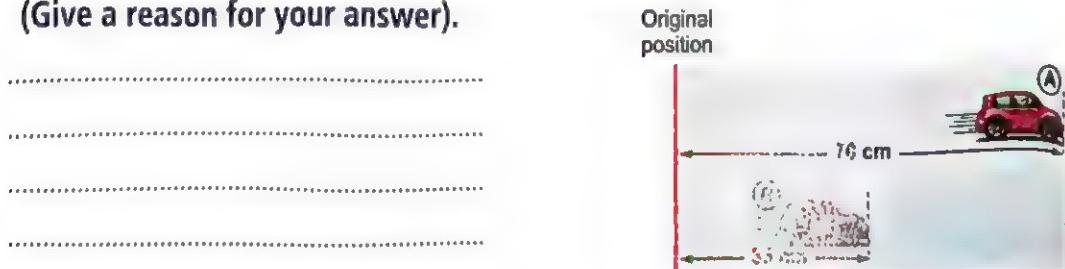
1. The work done by a basketball is equal to the amount of ..... transferred from the player hand to the ball.
2. If the same pulling force acts on two boxes, and one of them is larger than the other, the smaller box will move for a ..... distance.

3. When you lift up an object from the ground, there are two forces act on it, which are the ..... force of your hand and ..... force of the gravity.
4. We can say that the object is in motion relative to a ..... starting point.

(B) The following figure shows two similar toy cars :

Which of these two cars is affected by a greater force ?

(Give a reason for your answer).



## Self-Assessments

## **on Concept (2.2)**

**Self-Assessment** 18 On Lesson 1

**1 (A) Choose the correct answer :**



### (B) What happens to ... ?

The energy of a roller coaster when it moves from up to down.

**2) (A) Put (✓) or (✗) :**

1. Objects that don't move have no energy. ( )

2. As the roller coaster moves up a hill, it stores potential energy. ( )

3. Any stopped object that is put at a high place from the Earth's surface has potential energy. ( )

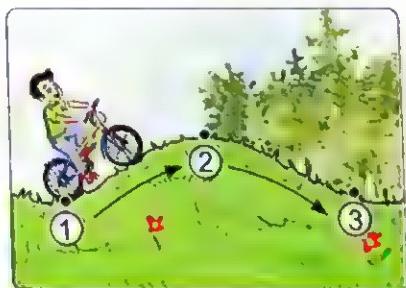
**(B) Give a reason for the following :**

A sand surfer moves very fast down the sand slope.

(according to the change of energy).

**3** Look at the following figure, then complete the following sentences :

1. The bicycle stores energy when it moves from point *stationary* to point .....  
2. The speed of the bicycle increases when it moves from point ..... to point *stationary*.  
3. The *kinetic* energy of the bicycle will ..... by increasing its speed.



**Self-Assessment 19 till Lesson 7****1 (A) Choose the correct answer :**

1. You do work in all the following situations, except
  - a. pushing a wooden box for a distance.
  - b. throwing a stone for a distance.
  - c. lifting a bag up for a distance.
  - d. pulling a big tree which doesn't move.
  
2. A flying airplane in the sky has .....
  - a. potential energy only.
  - b. kinetic energy only.
  - c. both potential and kinetic energies.
  - d. neither kinetic nor potential energies.
  
3. You can see all of the following, except .....
 

a. the light of the Sun.	b. the reflected light from the moon.
c. the light of the candle.	d. the sound of a radio.

**(B) Give a reason for the following :**

When a tennis ball is thrown upwards, its potential energy increases.

---

**2 (A) Put (✓) or (✗) :**

1. Sound energy can be seen easily. ( )
2. Work is a force that causes an object to move a distance. ( )
3. No work is done if a force is applied but the object doesn't move. ( )

**(B) What happens if ... ?**

A ball falls from your hand towards the ground.(according to the change of energy).

---

**3 Look at the opposite figure, then choose the correct answer :**

1. In figure (1), the ball has ..... energy.
 

a. kinetic	b. thermal
c. potential	d. sound
  
2. In figure (2), the potential energy of the ball is changed into ..... energy.
 

a. kinetic	b. light
c. sound	d. thermal

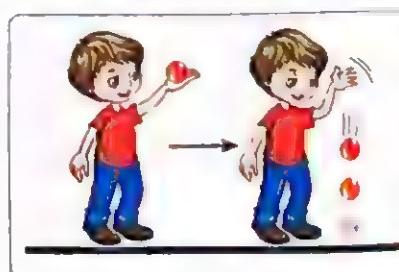


Figure (1)      Figure (2)



**Self-Assessment** 20 till Lesson 3

**1 (A) Choose the correct answer :**

1. The stored energy in a battery placed inside a flashlight can be changed into ..... energies.
    - a. sound and light
    - b. electrical and chemical
    - c. light and thermal
    - d. chemical and kinetic
  2. A bird flying in the sky has .....
    - a. potential energy only.
    - b. kinetic energy only.
    - c. both potential and kinetic energies.
    - d. neither potential nor kinetic energies.
  3. When a spring is compressed, it stores .....
    - a. chemical
    - b. potential
    - c. thermal
    - d. light

**(B) Give a reason for the following :**

The stored potential energy in a battery differs from that of a ball at the top of a hill.

**2 (A) Put (✓) or (✗) :**

1. Some forms of energy can be created and also can be destroyed. ( )  
2. There is only one form of energy, which is the potential energy. ( )  
3. Batteries stores electrical energy. ( )

### (B) What happens to ... ?

### **Changes of energy when throwing a ball upwards.**

**3** You have three devices (A), (B) and (C), if you know that :

- Device (A) changes chemical energy into light and thermal energies.
  - Device (B) changes electrical energy into kinetic energy.
  - Device (C) changes chemical energy into thermal energy.

**Choose correct answer :**

1. Device (A) may be .....

  - a. a flashlight.
  - b. a television.
  - c. an electric heater.
  - d. a radio.

2. Device (B) may be  
 a. an electric heater.  
 b. an electric lamp.  
 c. an electric fan.  
 d. a radio
3. Device (C) may be  
 a. a gas oven.  
 b. an electric fan.  
 c. an electric mixer.  
 d. a radio

### Self-Assessment 21

**1 Choose the correct answer :**

1. Both food and batteries,  
 a. store mechanical energy.  
 b. store thermal energy.  
 c. produce chemical energy.  
 d. produce light energy.
2. Both radio and television  
 a. are operated by gravitational energy.  
 b. are operated by mechanical energy.  
 c. produce sound energy.  
 d. produce chemical energy.
3. Electric heater produces ..... energy.  
 a. electrical      b. sound      c. thermal      d. light

**2 (A) Put (✓) or (✗) :**

1. The energies produced from television are sound and light. ( )
2. There are some forms of energy, that can be destroyed. ( )

**(B) You have four objects (A) , (B) , (C) and (D) , if you know that :**

- Object (A) can't move but can produce sound.
- Object (B) is an apple.
- Object (C) produces light and thermal energies.
- Object (D) doesn't produce light energy.

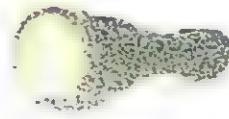
**Choose correct answer :**

1. Object (A) may be .....  
 a. an electric lamp.  
 b. a radio.  
 c. food.  
 d. a flashlight.
2. Object (B) stores ..... energy.  
 a. mechanical    b. thermal    c. chemical    d. light

3. Object (C) may be .....
- a. an alarm bell. b. a radio. c. food. d. the Sun.
4. Object (D) may be .....
- a. the Moon. b. the Sun. c. flashlight. d. electric lamp.

**3** Look at the following figure, then choose the correct answer :

1. Wires inside the flashlight have ..... energy.
- a. sound b. light  
c. electrical d. chemical
2. Which part inside the flashlight stores chemical energy / ...
- a. Battery. b. Wires.  
c. Lamp. d. Its body
3. Which form of energy in the flashlight you can see / ...
- a. Electrical energy. b. Light energy  
c. Thermal energy. d. Chemical energy.



# Model Exam

## on Concepts (2.1) & (2.2)

**1 (A) Choose the correct answer :**

(5 marks)

1. All the following objects are affected by unbalanced forces, except .....
  - a. a person sitting on a chair.
  - b. a ball moves on the ground.
  - c. a plane flying in the sky.
  - d. a person jumps up in the air.
  
2. When we turn on a television, ..... and ..... energies are produced.
 

a. sound – chemical	b. light – chemical
c. sound – light	d. solar – light
  
3. By increasing ..... and ....., the potential energy increases.
 

a. mass – weight	b. mass – height
c. mass – speed	d. height – speed
  
4. If we fix some fire extinguishers onto a cart, the air that moves ..... makes the cart moves forward.
 

a. forward	b. upward
c. downward	d. backward

**(B) What happens if ... ?**

A child moves down along the slide (concerning the change of energy).

.....

**2 (A) Put (✓) or (✗) :**

(5 marks)

1. Sound waves is a form of potential energy. ( )
2. We can say that a body is in motion if its position changes relative to a moving point. ( )
3. Food provides our bodies with energy. ( )
4. There is a work done, when you press on the button of the keyboard of a computer. ( )

**(B) Give a reason for the following :**

We can't live without eating food.

.....

**3 (A) Complete the following sentences using the words below :**

(5 marks)

(long – potential – gravity – work)

1. When a ball is pushed up in the air, the ball stores ..... energy.
2. If a pushing force is applied on a chair to move it, so a ..... is done.
3. The water in waterfall falls down into the lake due to the effect of .....
4. When you kick a ball on the ground hardly, it will travel a ..... distance.

**(B) Look at the opposite figure, then answer the following questions :**

1. What is the name of this truck ?

.....

2. What happens if this truck is not provided with parachutes ?

.....



# Self-Assessments

on Concept (2.3)

## Self-Assessment 22 On Lesson 1

### 1 (A) Choose the correct answer :

1. When a fast car hits a very big stone that doesn't move, all the following situations may happen, except .....
  - a. the speed of the car becomes zero and it will stop.
  - b. the energy of the car transfers to the stone.
  - c. the airbags are inflated and filled with a gas.
  - d. the car keeps moving and its speed increases.
2. The safety equipment that plays an important role during collision between cars includes .....
  - a. airbags only.
  - b. seatbelts only.
  - c. airbags and seatbelts.
  - d. car tires and steering wheel
3. During collision, all the following situations may occur to the speed of the crashed cars, except it will .....
  - a. increase.
  - b. decrease.
  - c. become zero.
  - d. remain as it is.

### (B) Give a reason for the following :

After collision, the airbags deflate through their holes as fast as they inflate.

.....

.....

.....

### 2 (A) Put (✓) or (✗) :

1. Hitting a cricket ball with the bat causes a change in its speed and its direction. ( )
2. The wrecking ball is used to destruct walls of buildings. ( )
3. Transferring kinetic energy occurs only from moving object to an object that doesn't move, when they collide together. ( )

### (B) What happens if ... ?

The sensors of the car airbags feel a strong crash with the car's body.

.....

### 3 Complete the following paragraph using the words below :

(different – kinetic – car)

When a moving car collides with a bicycle, the car transfers its ..... energy to the bicycle, so the bicycle moves in a ..... direction and is more damaged than the .....



**Self-Assessment 23 till Lesson 2**
**1 (A) Choose the correct answer :**

1. When a train traveled 600 kilometers in 6 hours, what is the speed of the train ? ....  
a. 50 km/hr.      b. 100 km/hr.      c. 150 km/hr.      d. 200 km/hr.
2. Which of the following speeds is the most dangerous on the driver's life on collision ? ....  
a. a car moves at 25 km/hr.      b. a car moves at 50 km/hr.  
c. a car moves at 75 km/hr.      d. a car moves at 100 km/hr.
3. The kinetic energy of an object sliding down on a ramp from height  $z$  meters is .... that of the same object when sliding down the same ramp from height 4 meter.  
a. less than      b. more than      c. equal to      d. faster than

**(B) Calculate the speed of a moving car, if you know that it covers a distance of 240 kilometers in 4 hours.**

.....

.....

**2 (A) Put (✓) or (✗) :**

1. When the kinetic energy of a moving body increases, its speed decreases. ( )
2. When the mass of an object increases, it needs less energy to move. ( )
3. Airbags slow the speed of the passengers' motion forward. ( )

**(B) What happens if ... ?**

The speed of a moving object increases. (according to its kinetic energy).

.....

**3 Choose from column (B) what suits it in column (A) :**

(A)	(B)
1. Speed	a. the speed of an object moves down on it increases.
2. Kilometer per hour	b. it is the distance that an object travels in a certain amount of time.
3. The angle of inclination increases	c. the measuring unit of distance. d. the measuring unit of speed.

1. ....

2. ....

3. ....

## Self-Assessment 24 till Lesson ...

**1 (A) Choose the correct answer :**

1. A wooden box that doesn't move, gains the largest amount of kinetic energy when a moving car with a speed equals ..... hits this box.  
a. 30 km/hr.      b. 50 km/hr.      c. 80 km/hr.      d. 120 km/hr.
2. If a car carries a heavy mass, the driver must move ..... to avoid damages of collisions.  
a. with a slow speed      b. with a high speed  
c. with a low potential energy      d. with a high potential energy.
3. When a fast moving truck collide with a slow moving small car, some of the kinetic energy of the truck .....  
a. is transformed into light energy.  
b. is transformed into solar and chemical energies.  
c. is transferred as kinetic energy to the small car.  
d. is destroyed and no longer exists.

**(B) What happens when ... ?**

Increasing the mass of an object that moves down a ramp.

(according to the kinetic energy of the object).

.....

.....

.....

**2 (A) Put (✓) or (✗) :**

1. Objects that have the same masses and move with different speeds, have the same amount of kinetic energy. ( )
2. When a vehicle with a high amount of kinetic energy collide with a standing person, the vehicle pushes the person for a long distance. ( )
3. If a collision happens between two light and slow objects that move in the same direction, a small amount of damage is occurred. ( )

**(B) Give a reason for the following :**

The kinetic energy of an object that moves down a ramp increases by increasing the angle of the ramp.

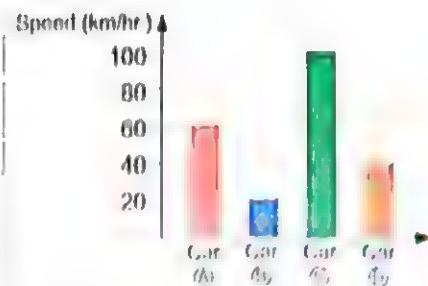
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.....



**3** Look at the opposite graph, then choose the correct answer :

1. Which car has the most kinetic energy ? ....  
a. A      b. B  
c. C      d. D
2. Car (D) has kinetic energy more than car .....  
a. A      b. B      c. C      d. D
3. If a collision occurs between car ..... and a wall , it will cause the most damage.  
a. A      b. B      c. C      d. D
4. If a collision occurs between car ..... and a wall, it will cause the least damage.  
a. A      b. B      c. C      d. D



### Self-Assessment 25

**1** (A) Choose the correct answer :

1. If there is a collision between two large-mass objects at high speeds, and another collision between two small-mass objects at low speeds, so .....  
a. both collisions don't cause any damage.  
b. both collisions cause the same amount of damage.  
c. the first collision causes more damage than the second collision.  
d. the first collision causes less damage than the second collision.
2. After collision, the distance that the last ball move on the other side of the Newton's cradle, depends on .....  
a. the stored sound energy in it.  
b. the stored kinetic energy in it.  
c. the kinetic energy that is transferred from the previous balls.  
d. the electrical energy that is transferred from the previous balls.
3. If a moving car makes a collision, which of the following speeds causes the lowest amount of damage to that car ? .....  
a. 60 km/hr.      b. 75 km/hr.      c. 80 km/hr.      d. 50 km/hr.

(B) Give a reason for the following :

A sound can be heard during the collision between the Newton's cradle balls.

**2 (A) Put (✓) or (✗) :**

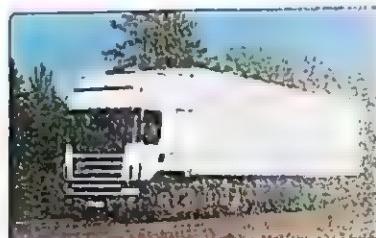
1. When you raise up a ball in the Newton's cradle, it stores thermal energy. ( )
2. Large-mass vehicle and small-mass vehicle, have the same kinetic energy when they move with the same speed. ( )
3. If you drive at a high speed, you have to stop gradually to avoid pushing forward inside the car. ( )

**(B) What happens if ...?**

You leave the moving balls of the newton's cradle move for a long time  
(according to their energies).

**3 Look at the opposite photos, then choose the correct answer :**

Train speed = 90 km/hr.



Truck speed = 90 km/hr.

1. Kinetic energy of the train is ..... that of the truck.  
a. less than      b. more than      c. equal to      d. half to
2. During collision, the train causes more damage than the truck as it has ..... the truck.  
a. more mass than      b. less mass than  
c. equal mass as      d. half the mass of
3. All the following sentences are correct, except .....  
a. the train has the most mass.  
b. the train and the truck have the same speed.  
c. the truck has the most mass.  
d. the truck has the least kinetic energy.

# Model Exam

### **on Theme (2)**

Total mark

1

**(A) Choose the correct answer :**

- When you move something toward you, this represents . . . .
    - pushing force.
    - light energy.
    - pulling force.
    - sound energy.
  - The roller coaster has the most energy of motion, .....
    - when it goes up to the top of the hill.
    - when it goes down the hill.
    - when it stops at the top of the hill.
    - when it stops at the bottom of the hill.
  - Which of the following sentences describes the friction force ? ....
    - It pulls objects toward the ground.
    - It pushes objects away from the ground.
    - It doesn't affect objects in motion.
    - It slows down or stops objects in motion.
  - The object that has the most kinetic energy, is ..... object.
    - the fastest and lightest
    - the slowest and lightest
    - the fastest and heaviest
    - the slowest and heaviest

**(B) Give a reason for the following :**

The Shockwave truck is faster than the normal truck.

**2 (A) Put (✓) or (✗) :**

(5 marks)

1. If two objects travel for equal amount of time, the object that travels a longer distance has a slower speed. ( )
  2. When a cricket bat hits the ball, its potential energy transfers to the ball. ( )
  3. The main difference between pulling and pushing forces is the direction of the force. ( )
  4. You can change kinetic energy into stored potential energy, when you compress a toy spring. ( )

### (B) What happens if ... ?

The airbags in a car don't inflate during a crash.

**3) (A) Write the scientific term of each of the following :**

(5 marks)

1. A force that you make to change the direction of an object away from you. (.....)

2. The form of energy that increases when the speed of an object increases. (.....)

3. The distance that an object travels in a certain amount of time. (.....)

4. Safety equipment used to prevent car passengers from moving forward, when the car stops suddenly. (.....)

**(B) Cross out the odd word :**

Electrical energy – Chemical energy – Thermal energy – Sound energy.

(.....)

# Assess your Learning

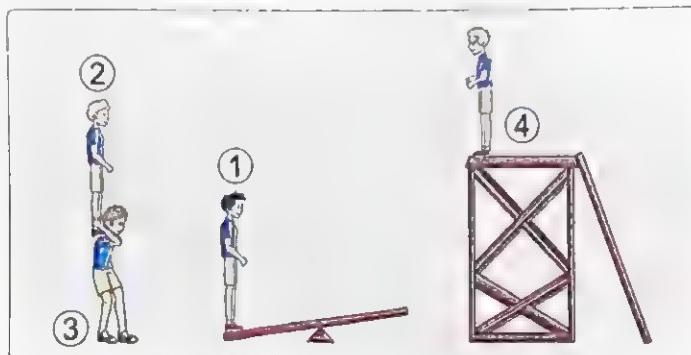
## QUESTION BANK AND PRACTICE TESTS

### 1 Choose the correct answer :

1. In the following figure, the body is under the effect of



- a. balanced forces and moving to the right.
  - b. balanced forces and moving to the left.
  - c. unbalanced forces and moving to the right.
  - d. unbalanced forces and moving to the left.
2. The force that slows down or decreases the speed of an object is the ..... force.
- a. pushing
  - b. gravity
  - c. friction
  - d. pulling
3. In the opposite figure, which one of the players has the greatest potential energy ? .....



- a. Player (1).
  - b. Player (2).
  - c. Player (3).
  - d. Player (4).
4. The energy gained by a ball when it falls from a high place is ..... energy.
- a. potential
  - b. kinetic
  - c. light
  - d. chemical
5. If the angle of inclination of a surface increases, so the speed of the rolling body .....
- a. decreases.
  - b. increases.
  - c. is not affected.
  - d. equals zero.
6. When a collision occurs, the sum of the energies before the collision is ..... the sum of the energies after the collision.
- a. equal to
  - b. less than
  - c. more than
  - d. not equal
7. When a moving car stops suddenly, the passenger's body moves .....
- a. to the right direction.
  - b. to the left direction.
  - c. forward.
  - d. backward.

**2 Answer the following questions :**

1. In the picture in front of you :

- a. Are the forces on both sides balanced or unbalanced ?

- b. In which direction will the children move ? (Right or Left)



2. If two cars moved at the same time for 20 seconds, car (A) covered a distance of 100 meters, while car (B) covered a distance of 150 meters. Which of the two cars has the higher speed ?

3. In the opposite figure :

When the compressed spring is released, a change in energy occurs from ..... energy to ..... energy.

**3 Choose from column (B) what suits it in column (A) :**

(A)	(B)
1. Gravity	a. the energy stored inside the body.
2. Friction	b. the force that pulls things downward.
3. Speed	c. a force that arises between the surfaces of two contacted bodies.
4. Potential energy	d. energy stored inside dry batteries.
	e. the distance covered per unit time.

1. ....

2. ....

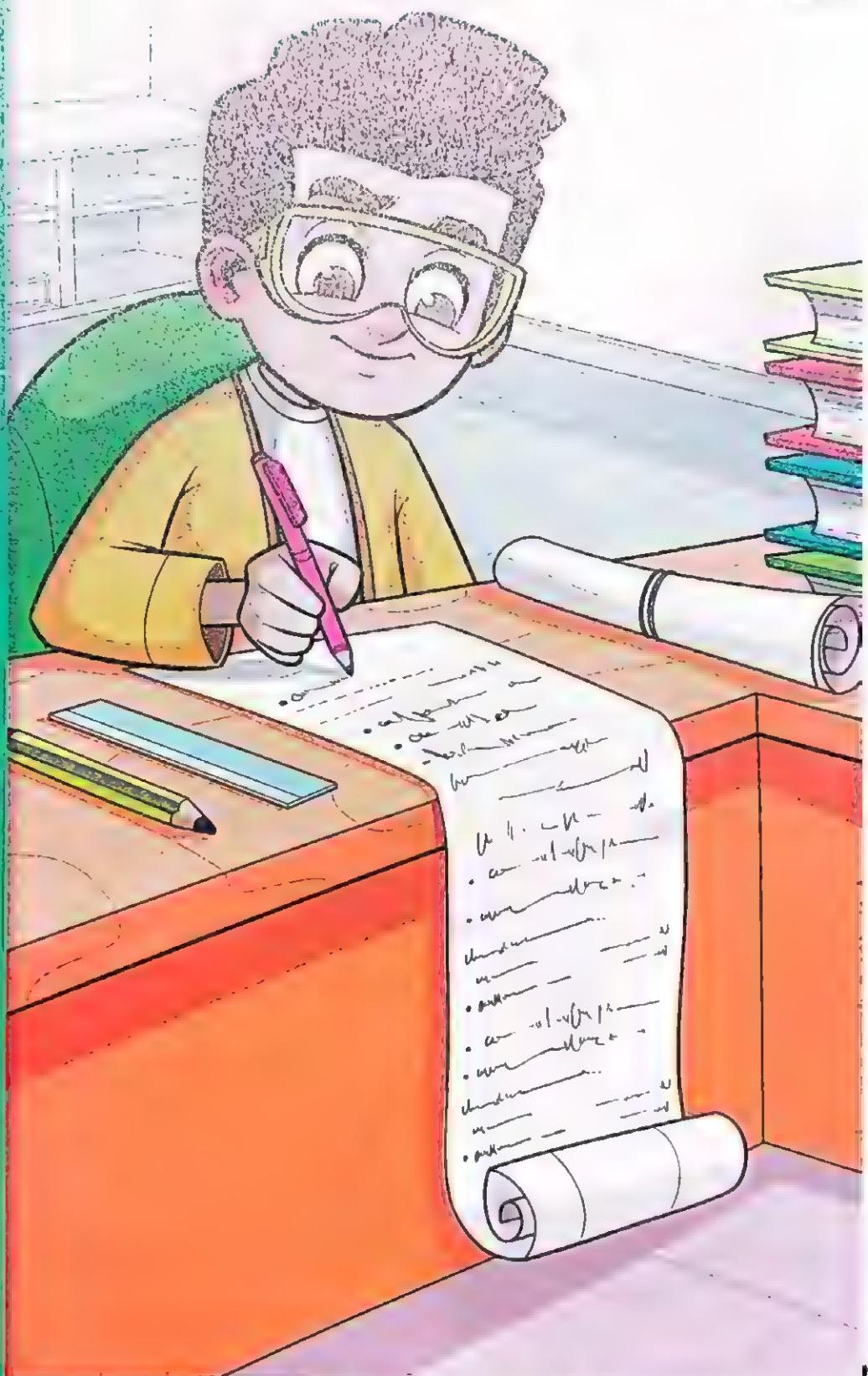
3. ....

4. ....

## FINAL REVIEW

2

PART



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of Part Two

Final Revision

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# Review on Concept (1.1)

## 1 Scientific terms (Definitions)

Scientific terms	Definitions
<b>1. Adaptations :</b>	They are characteristics that help living organisms to survive and reproduce in the ecosystem in which they live.
<b>2. Camouflage :</b>	It is a type of adaptation that some animals use to hide from their predators or their preys by blending in with the surrounding environments.
<b>3. Structural adaptation :</b>	It is a change in the body structure of a living organism to help it survive.
<b>4. Behavioral adaptation :</b>	It is a change in the behaviors or acts of a living organism to help it survive.
<b>5. System :</b>	It is a group of organs that work together to perform a specific job.
<b>6. Digestion process :</b>	It is a process of breaking down food into smaller parts that the body cells absorb and use them to get energy and grow.
<b>7. Respiration process :</b>	It is a process of pulling air in (inhalation) and pushing air out (exhalation) of the body.

## 2 Importance or uses :

Items	Importance or uses
<b>1.Teeth :</b>	They crush food during chewing.
<b>2.Saliva :</b>	It moistens food and begins to break it down.
<b>3.Tongue :</b>	It mixes food with saliva in the mouth.
<b>4.Esophagus :</b>	It allows the food to move from throat down into the stomach.
<b>5.Stomach :</b>	Mixing food with the stomach acid and digestive juices (enzymes) found in it to change the food into a soupy liquid.
<b>6.The small intestine :</b>	Breaking down of food into nutrients by the help of the juices of liver and pancreas.
<b>7.The large intestine :</b>	Absorbing the water from undigested materials.
<b>8.Throat :</b>	- It allows the food to pass from the mouth to the esophagus. - It allows the air to pass from the nose to the trachea.
<b>9.Trachea :</b>	It allows the air to pass from the throat to the two lungs.
<b>10.Two bronchi :</b>	They allow the air to pass from the trachea to the two lungs.

**3 Give reasons for :**

- 1. The starred agama lizard always looking for shade areas in desert.**  
To keep its body cool during hot sunny days.
  
- 2. The penguin's body has a thick layer of fat and dense feathers.**  
To keep its body warm.
  
- 3. The blood vessels in the penguin's feet weave around each other.**  
To keep its toes from freezing as the warm blood vessels heat up the cold blood vessels.
  
- 4. Some desert lizards have colorful scales.**  
To hide among the colorful rocks in the desert.
  
- 5. Fennec fox has sandy-colored fur, while polar bear has a white fur.**  
Fennec fox has a sandy-colored fur to blend in with desert landscapes, while polar bear has a white fur to blend in with snow in polar region.
  
- 6. Some animals have the ability to make camouflage adaptation.**  
Because camouflage helps some animals hide from their predators or preys in different environments.
  
- 7. Fennec fox has a tan-colored coat.**  
To hide in a sandy, rocky environment and to protect it from the hot Sun.
  
- 8. Fennec fox undergoes panting.**  
To cool its body.
  
- 9. Arctic fox has a thick fur coat.**  
To keep its body warm in extreme cold climate.
  
- 10. The fur of arctic fox is white during winter but it turns brown in summer.**  
To help it sneaks up on prey in any season.
  
- 11. Burrows are excellent places for arctic and fennec foxes.**  
Because burrows help:  
- Fennec fox to stay cool during the sunny day.  
- Arctic fox to stay warm at night.

**12. Fennec fox has extra-large ears, while arctic fox has short ears.**

Extra-large ears help the fennec fox to lose the heat to cool its body, while short ears help the arctic fox to stay warm.

**13. Bull sharks have less competition for finding food in fresh water.**

Because other types of sharks live in salt water only.

**14. Panther chameleon has V-shaped feet and a long tail.**

To hold tightly the branches of trees.

**15. Branches of acacia tree gather on the top of its trunk.**

To prevent animals from reaching its leaves to feed on.

**16. Acacia tree has sharp spines around its leaves.**

To prevent animals from eating these leaves.

**17. Wind is important to acacia tree.**

Because acacia tree uses wind to send smelly message to acacia trees nearby telling them to start making a poisonous substance.

**18. Kapok tree has hand-shaped leaves.**

To allow wind to move more gently through the leaves without tearing them.

**19. Kapok trees stay firmly rooted in the soggy soil although they are very tall.**

Due to presence of large, wide roots called buttress roots.

**20. Pine tree has a triangular shape and short branches.**

To allow the snow slide easily over it, so its branches don't break.

**21. Water lilies have wide floating leaves.**

To absorb a large amount of sunlight.

**22. Mangrove tree has long and strong roots.**

To resist the water waves.

**23. Palm trees have thick roots and small leaves.**

To resist the strong winds.

**24. Barbary fig has sharp spines.**

To prevent animals from eating its fruits and leaves.

**25. The human body is made up of different systems.**

To perform different functions.

**26. The importance of juices of liver and pancreas.**

Because they help in breaking down food into nutrients.

**27. Anus is an important organ in the digestive system.**

Because solid wastes leave the body through it.

**28. The inhaled air differs from the exhaled air.**

Because the inhaled air is rich in oxygen gas, while the exhaled air is rich in carbon dioxide gas.

**29. Diaphragm plays an important role in respiration process.**

Because it contracts and moves downward during inhalation to increase the size of chest, while it relaxes and moves upward during exhalation to decrease the size of chest.

**30. Gills are unique structural adaptation in fish.**

Because they enable fish to extract oxygen gas from water for respiration.

**31. Cars and factories exhausts cause breathing problems.**

Because they produce smog which causes damage of lungs, asthma and heart diseases.

**32. Sometimes people in big cities are forced to change their lifestyle.**

To decrease air pollution.

**33. Skin of fish is different from that of frog, although both of them live in water.**

Because skin of frog can absorb oxygen gas directly from water, while fish cannot.

**34. Dry seasons is very harmful for amphibians.**

Because their skin must be wet all the time, to be able to get oxygen gas directly from water.

**35. Pollution of air and water can affect the survival of amphibians.**

Because they breathe in oxygen gas from water and air.

**36. Scientists must study how amphibians interact with their environments.**

To help them survive.

#### 4 What happens ... ?

- 1. If the warm blood vessels and cold blood vessels in the penguin's feet do not weave around each other.**  
The blood moving up into the penguin's body will be cold which may make it freeze.
  
- 2. If the polar bear has thin fur instead of its thick fur.**  
It cannot adapt with the very cold weather in polar regions.
  
- 3. If the body of fennec fox is covered with black fur.**  
It cannot hide and hunt its preys in the desert environment.
  
- 4. If some types of lizards are not able to make camouflage adaptation.**  
They cannot hide from their predators or preys in their environments.
  
- 5. If arctic fox has a brown coat during winter but it turns white during summer.**  
It cannot hide from its prey in winter or summer.
  
- 6. If fennec fox has short ears.**  
It cannot cool its body.
  
- 7. If the sense of hearing becomes weak in foxes.**  
They cannot hunt easily.
  
- 8. If arctic fox has only a white coat during all seasons of the year.**  
It cannot sneak up on prey in summer season.
  
- 9. If both eyes of panther chameleon move in one direction only.**  
The panther chameleon cannot hunt its prey and avoid becoming a prey at the same time.
  
- 10. If panther chameleon is exposed to danger.**  
It puffs up its body with air, opens its mouth wide and changes the color of its scales.
  
- 11. If the length of acacia taproot doesn't exceed 3 meters downward.**  
It can't search for water in the deep soil.
  
- 12. If the acacia leaves are not guarded by sharp spines.**  
Animals can eat these leaves easily.
  
- 13. If there are no buttress roots in the kapok tree.**  
Kapok tree can't stay firmly in soggy soil.

- 14. If the pine tree has an umbrella shape not a triangle shape.**  
The snow can't slide easily over its branches and the branches break down more easily.
  
- 15. If some plants of rainforest habitat became very short.**  
The sunlight can't reach these plants easily.
  
- 16. If water lily has narrow leaves instead of wide leaves.**  
It can't absorb a large amount of sunlight.
  
- 17. If palm tree has thin roots and large leaves.**  
It can't resist the strong winds.
  
- 18. If the small intestine is removed from the human body.**  
The digestive system could not do its function correctly.
  
- 19. If the nutrients absorbed by the walls of small intestine enter the tiny blood vessels.**  
The blood carries these nutrients to all the body parts.
  
- 20. If the diaphragm moves downward during inhalation.**  
The size of chest increases, the air rich in oxygen gas enters the lungs.
  
- 21. If the diaphragm moves upward during exhalation.**  
The size of chest decreases, the air rich in carbon dioxide gas comes out of the lungs.
  
- 22. If human activities and bad habits increase.**  
The pollution of air, water and soil will increase.
  
- 23. If the exhausts from cars and factories increase in big cities.**  
Smog increases causing breathing problems as damage of lungs, asthma and heart diseases.
  
- 24. If water pollution increases (for humans and fish).**  
Humans cannot get clean water to drink and fish cannot get clean water to breathe.
  
- 25. If pollution level increases in the natural habitat of amphibians.**  
The number of amphibians will decrease.
  
- 26. If the ecosystem of amphibians is containing clean air and water.**  
Amphibians will survive and their numbers increase.
  
- 27. If amphibians don't have lungs and breathe only through skin.**  
They can live only under water.

**28. If the number of predators of amphibians Increases.**

The number of amphibians will decrease.

**29. If salamanders have lungs only to respire.**

Salamanders can live on land only.

**30. If skin of frogs becomes dry.**

They cannot survive.

## 5 Comparisons :

**1. Penguin, polar bear, brown (black) bear, fennec fox and desert lizards.**

Points of comparison	Penguin	Polar bear	Brown (black) bear	Fennec fox and Caracal	Desert lizards
1. Habitat :	Antarctic region	Arctic region	Forests	Desert	Desert
2. Body is covered with :	Dense feathers	White thick fur	Dark fur	Sandy-colored fur	Colorful scales

**2. Fennec fox and arctic fox :**

Points of comparison	Fennec fox	Arctic fox
1. Habitat :	Hot desert	Tundra desert
2. Color of fur :	Tan-colored	White in winter, brown in summer
3. Shape of ears :	Extra-large	Small
4. Hiding in burrows :	During sunny days	At night

**3. Structural adaptation and behavioral adaptation :**

Points of comparison	Structural adaptation	Behavioral adaptation
1. Definition :	It is a change in the <b>body structure</b> of a living organism to help it survive.	It is a change in the <b>behaviors or acts</b> of a living organism to help it survive.
2. Examples :	• The blood vessels in the penguin's feet.	• Desert lizard looks for shade during hot sunny days.
	• The thick fur of the polar bear.	• Migration of some animals towards certain regions.

**4. Acacia tree and kapok tree :**

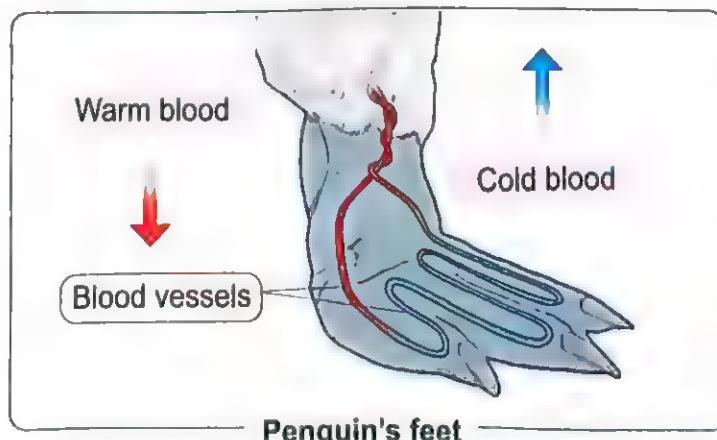
Points of comparison	Acacia tree	Kapok tree
1. Habitat :	Savannah	Rainforest
2. Leaves :	Tiny	Hand-shaped
3. Roots :	Very long (taproot)	Large wide (buttress roots)

**5. Mangrove tree, water lily, pine tree, palm tree and barbary fig:**

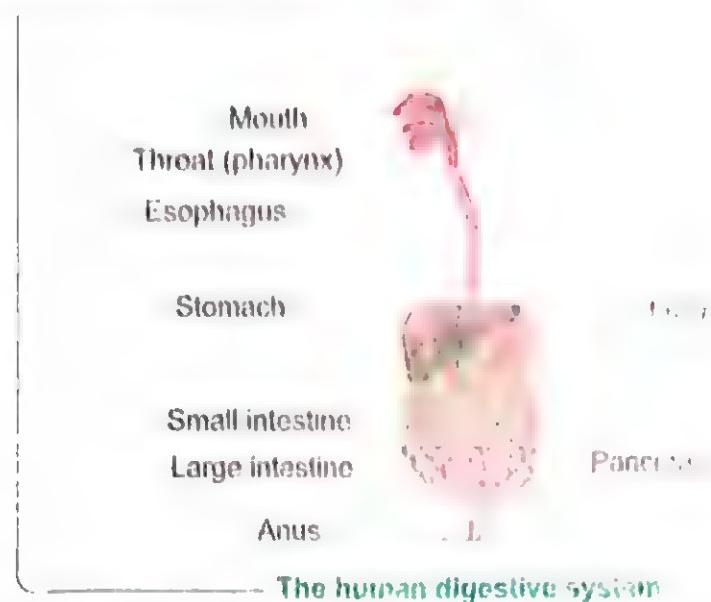
Points of comparison	Mangrove tree	Water lily	Pine tree	Palm tree	Barbary fig
1. Habitat :	Salt water	Fresh water	Snow	Desert	Desert
2. Structural adaptation :	Long strong roots	Wide floating leaves	Triangular shape, short branches and needle leaves	Thick roots and small leaves	Sharp spines and tough cover

**6. Inhalation and exhalation :**

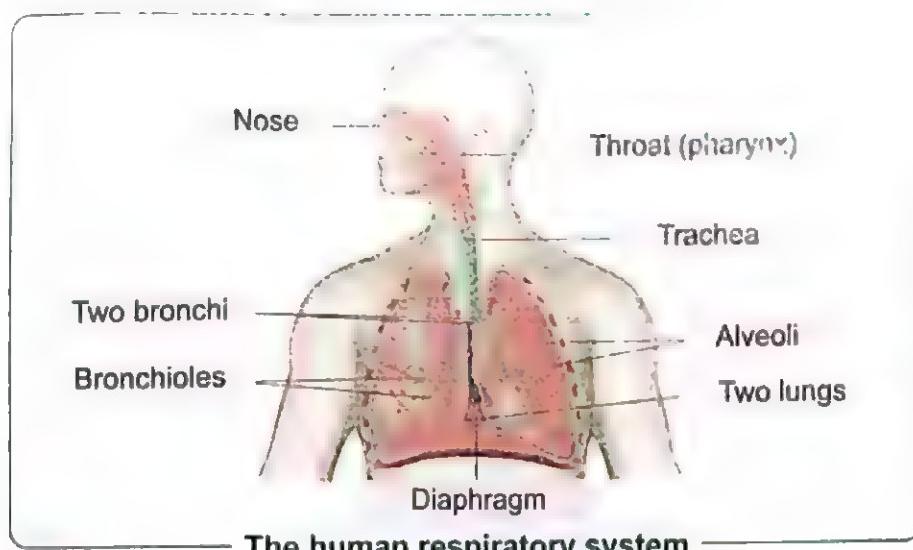
Points of comparison	Inhalation	Exhalation
1. Diaphragm :	Contracts and moves downwards	Relaxes and moves upwards
2. The size of chest :	Increases	Decreases
3. The air is rich in :	Oxygen gas	Carbon dioxide gas

**6 Important drawings:****1. Penguin's feet.**

## 2. The human digestive system.



## 3. The human respiratory system.



### Main points

- Living organisms have different ways (adaptations) to protect themselves from different climates.
- Examples of some animals that make adaptation to survive in their environment through camouflage :**
  1. Polar bear.
  2. Brown bear and black bear.
  3. Caracal and fennec fox.
  4. Some desert lizards.

• **Types of adaptations :**

**1. Structural adaptation :** Example : The blood vessels in the penguin's feet.

**2. Behavioral adaptation :** Example : Desert lizard looks for shade during hot sunny days.

• **Plants can make adaptation to survive in their environments such as :**

- Acacia tree in Southern African Savannah, it has a very long taproot that grows directly downward to search for water below the soil surface, a very long trunk and tiny leaves.

- Kapok tree in Amazon rainforest of Brazil has buttress roots that are not planted deeply in the ground, but they grow high up on its trunk to hold the tree firmly in the soggy soil and hand-shaped leaves with narrow parts.

**Some animals and their structural and behavioral adaptations :**

Animals	Structural adaptation	Behavioral adaptation
<b>Fennec fox :</b> (lives in hot dry desert).	<ul style="list-style-type: none"> <li>It has a tan-colored coat.</li> <li>It has extra-large ears.</li> </ul>	<ul style="list-style-type: none"> <li>It pants like dogs.</li> <li>It lives in burrows.</li> <li>It eats all kinds of food.</li> </ul>
<b>Arctic fox :</b> (lives in tundra desert).	<ul style="list-style-type: none"> <li>It has a thick fur coat.</li> <li>Its fur coat is white during winter but turns brown in summer.</li> <li>It has short ears and legs.</li> </ul>	<ul style="list-style-type: none"> <li>It lives in burrows</li> <li>It eats all kinds of food.</li> </ul>
<b>Bull shark :</b> (lives in fresh water and salt water).	It uses countershading feature, in which the upper surface of its body is darker than its lower surface.	<ul style="list-style-type: none"> <li>It eats different types of food.</li> <li>It hunts during the day and at night.</li> </ul>
<b>Panther chameleon :</b> (lives in tropical rainforest).	<ul style="list-style-type: none"> <li>Its eyes can face opposite directions and move independently.</li> <li>It has brightly colored scales.</li> <li>It has V-shaped feet and tail like a hand.</li> </ul>	<ul style="list-style-type: none"> <li>It puffs up its body with air.</li> <li>It opens its mouth wide.</li> <li>It changes the colors of its scales.</li> </ul>

- A body consists of group of systems; each system consists of group of organs that work together to perform a specific job.
- The digestive system breaks down food into smaller parts that your body can use.
- Digestive system of human consists of :
  1. Mouth.
  2. Throat (pharynx).
  3. Esophagus.
  4. Stomach.
  5. Small intestine.
  6. Large intestine.
- Respiratory system is the system responsible for breathing.
- Respiratory system of human consists of :
  1. Nose.
  2. Throat (pharynx).
  3. Trachea.
  4. Two bronchi.
  5. Two lungs.
  6. Diaphragm.
- Respiration process includes :
  1. Inhalation.
  2. Exhalation.
  - Living organisms breathe in oxygen gas and breathe out carbon dioxide gas.
  - Humans have lungs to inhale oxygen gas from air to adapt to live on land.
  - Fish have gills to inhale oxygen gas from water to adapt to live under water.
  - Amphibians respire through lungs and skin to adapt to live on land and in water.
  - We have to keep air, water and soil clear, in order to protect living organisms from extinction.

# Review on Concept (1.2)

## 1 Scientific terms (Definitions):

Scientific terms	Definitions
1. Echo :	The bouncing back of sound waves when they hit a hard surface.
2. Echolocation :	The property that animals depend on to determine the location of other living organisms or objects by using the sound reflected from them.
3. Nocturnal animals :	They are animals that become active at night to look for their food.
4. Sensory receptors :	They are nerves found in different parts of the body that are responsible for receiving information from the environment.
5. Reaction time :	It is the time taken by the body of a living organism to respond and react to different information from the environment (such as danger).
6. Reflexes :	They are messages sent by the nervous system that are often so fast that you cannot realize them.
7. Special cane of blind person :	It is a simple tool (device) used by blind people to walk safely.

## 2 Importance or uses :

Items	Importance or uses
1. Echolocation :	Used to determine the location of other living organisms.
2. The nervous system :	1. It gathers information through the sensory organs. 2. It makes sense of (translates) these information through the brain. 3. It tells the body what to do according to these information.
3. The brain :	The main control center in the body.
4. The spinal cord :	It carries messages from the brain to the body parts and vice versa.
5. Nerves :	They carry messages from the brain to the spinal cord and other parts of the body and vice versa.

<b>6. Nurse ants :</b>	They send smelly messages to scout ants when the food is low.
<b>7. Scout ants :</b>	They are responsible for locating food.
<b>8. Soldier ants :</b>	They use smelly messages to communicate danger nearby.
<b>9. Special cane of blind person :</b>	Its vibrations tell him the direction of the objects and other objects around him.

**Give reasons for****1. The Egyptian mongooses make sounds.**

To communicate with other mongooses to move from one place to another and when searching for food.

**2. Owls can hunt during the night.**

Because they have extraordinary senses of hearing and sight that make them able to find their preys in the dark.

**3. Dogs are used in guarding.**

Because they have very sharp senses of hearing and smell.

**4. Dolphins can hear all kinds of sound.**

Because they have sharp senses of hearing, so they can hear all kinds of sound.

**5. Animals that live in hot regions become active at night.**

Because the weather becomes cool at night in these regions.

**6. Owls have bowl-shaped faces.**

To pick up and amplify distant sounds then direct these sounds into the owl's ears.

**7. Bats can catch insects in the dark.**

Because they depend on echolocation to find insects at night.

**8. Owl is a nocturnal animal.**

Because it becomes active at night.

**9. The Egyptian jerboa can jump for long distances.**

Because it has long hind legs that make it jump for long distances.

**10. The presence of hair on the Egyptian jerboa's feet and toes.**

To help it grip the sand when it jumps.

- 11. The Egyptian jerboa's ears play a very important role in its survival.**  
Because it has large and sensitive ears, so it can detect even a quiet snake.
  
- 12. Humans can recognize the sound of different musical instruments.**  
Because ears receive the different sounds and transmit them to the brain to be processed, so brain can determine the type of musical instrument.
  
- 13. The brain has an important function in the nervous system.**  
Because it is the main control center of the body.
  
- 14. The nurse ants send smelly messages to scout ants.**  
To alert the scout ants that the food is low.
  
- 15. The soldier ants use smells in their communication.**  
To communicate with the other ants in case of danger.
  
- 16. The songs of humpback whales have high-pitched sounds during winter months.**  
Because high-pitched sounds travel better through cold water.
  
- 17. Humpback whales sing different songs.**  
To communicate with each other in different seasons.
  
- 18. The echo that is picked up by the special cane of blind people turned into vibrations.**  
To tell the blind person where objects are around him.
  
- 19. The blind people cannot hear the sound that emits from their special canes.**  
Because their special canes emit a high-pitched sound that human's ears cannot hear it.

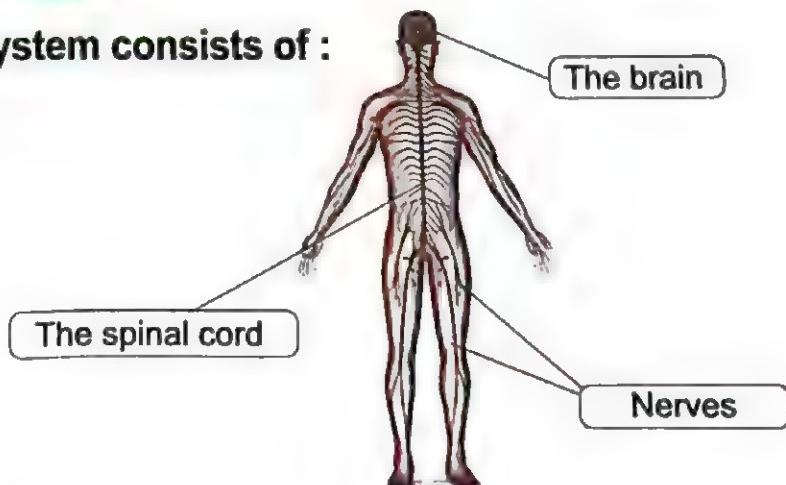
**4 What happens ...?**

- 1. To the sound waves produced by a dolphin when they hit an object under water.**  
The sound waves bounce back to the dolphin in the form of echo so, the dolphin can detect the location of this object.
  
- 2. If bats lose the ability to hear by using echolocation property.**  
They cannot hunt at night.
  
- 3. If owls cannot turn their heads in all directions.**  
They cannot search for preys everywhere, but in one direction only.
  
- 4. If your hand touches the spines of a barbary fig plant.**  
The hand will move quickly away in less than one second.

- 5. If the Egyptian jerboa hears a snake moves towards it.**  
It hops in zigzag patterns, so it can escape quickly from danger.
- 6. If the spinal cord became absent from the components of the nervous system.**  
Messages cannot be transmitted between brain and body parts.
- 7. If sensory receptors related to the eyes stopped sending messages to the brain.**  
Brain cannot process what is seen by the eyes.
- 8. If the smell sense of ants becomes weak.**  
They cannot communicate with each other by smelly messages.
- 9. If the amount of food in the ants colony decreases.**  
The nurse ants send smelly messages to scout ants to alert them to find the food.
- 10. If there is a danger near to an ants colony.**  
The soldier ants send smelly messages to alert the other ants that there is a danger nearby.
- 11. If high-pitched sound that is produced by the blind person's cane hits an object.**  
It bounces back to the cane in the form of echo which is turned into vibrations.
- 12. If bats cannot use echolocation property.**  
They cannot communicate with each other or locating the objects by the sense of hearing.
- 13. If the hearing sense of humpback whales becomes weak.**  
They cannot communicate by songs using their hearing sense.
- 14. There is a wall in front of a blind person uses his special cane.**  
The cane will make vibrations that tell the blind person that there is a wall in front of him.

### 5 Important drawing :

The nervous system consists of :



**6 Main points**

- We can summarize this concept in the following main points :

- Some animals have sharp senses to help them adapt to their habitats and survive.
- The sharpest sense in dolphins is hearing, so that a dolphin can locate its preys by using echolocation (echo).
- Some animals can look for their food at night using their super senses, these animals that become active at night are known as "Nocturnal animals".

- Super sensory adaptations of nocturnal animals.

- Bats : Rely on echolocation to find their food and move around.
- Owls : - Have both extraordinary sight and hearing.
  - Bowl-shaped faces and specialized head feathers pick up and amplify distant sounds then direct these sounds into the owls' ears.
  - Owls' large eyes allow them to detect tiny and faraway movements of their preys that hide in the grass or under the snow.
  - Owls have the ability to turn their heads in all directions to search for preys everywhere.

- The nervous system consists of :

- The brain : It is connected to the spinal cord.
- The spinal cord : It is a big nerve that runs through the backbone.
- Nerves : They are distributed throughout the body and connect the sense organs and the body parts with the brain.
- The nerves transmit information from the sensory organs to the brain.
- The five sensory organs contain a special type of nerves known as **sensory receptors**.

- The Egyptian jerboa is a desert rodent that has :

- large and sensitive ears.
- long hind legs.
- hair on its feet and toes.

- Functions of the nervous system :

1. It gathers information through the sensory organs like the eyes, ears and skin.
  2. It makes sense of (translates) these information through the brain.
  3. It tells the body what to do according to these information.
- Some messages called "reflexes", are so fast that you cannot realize it such as moving your hand away when touching a very hot cup of tea.
  - Other messages are sent from and to the brain automatically, like the signal to breathe.

- Humans and animals use variety of ways to communicate with each other as sound, light and movement.

- Ants communicate with each other through their sense of smells such as :

1. Nurse ants send smelly messages to scout ants when the food is low.
2. Scout ants respond by sending a smelly message to alert the ants where to find the food.
3. Soldier ants use smelly messages to communicate if there is danger nearby.

- Humpback whales sing under water to communicate with each other :

- In winter, the songs of humpback whales have high-pitched sounds that travel better through cold water.
- In summer, the songs of humpback whales have low-pitched sounds that travel better through warm water.
- Scientists created a special cane that emits a high-pitched sound just like bats do to help blind people detect their surroundings.

# Review on Concept (1.3)

## 1 Scientific terms (Definitions):

Scientific terms	Definitions
1. A source of light :	It is something that emits its own light.
2. Light :	It is a visible form of energy that travels in the form of waves.
3. Opaque objects :	They are objects that don't allow light to pass through.
4. Transparent objects :	They are objects that allow light to pass through.
5. Code :	It is a pattern that has meaning.

## 2 Importance or uses:

Items	Importance or uses
1. Night vision goggles :	It is used by human to see in the dark.
2. Mirror-like membrane :	It reflects light allowing the fishing cat's eyes to collect more light.
3. Lighthouse :	It sends codes in the form of flashes of light tell sailors where they are.

## 3 Give reasons for:

### 1. The fishing cat's eyes seem to glow in the dark.

Because it has a mirror-like membrane at the back of its eyes which bounces off the light.

### 2. Candle is considered as a source of light.

Because it gives off its own light.

### 3. Shadow of an opaque body is formed when light falls on it.

Because the opaque body doesn't allow light to pass through.

### 4. You can see an object placed behind a glass cup.

Because the glass cup is a transparent material which allows light to pass through.

- 5. A mirror can reflect light better than a painted surface.**  
Because the mirror is more smooth than the painted surface.
  
- 6. Humans receive and send information through speaking, writing and reading.**  
To communicate with each other.
  
- 7. Firefly beetles use different patterns of flash lights to communicate with each other.**  
To warn off from predators or to attract a mate.
  
- 8. Firefly beetles produce a chemical reaction inside their bodies.**  
To light up their bodies and communicate with each other.
  
- 9. The symbols that are used in writing have a specific pattern.**  
To give a specific meaning according to the arrangement of letters in a word.
  
- 10. People use face expressions during talking with each other.**  
To help people predict our feeling.

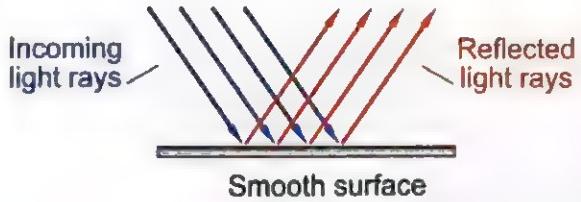
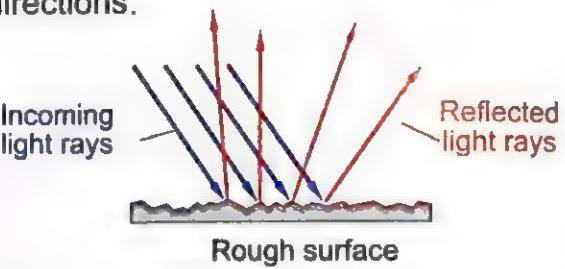
#### 4 What happens if ... ?

- 1. The mirror-like membrane in the fishing cat's eyes is not present.**  
It cannot see clearly and hunt at night.
  
- 2. The moon can't reflect the sunlight.**  
It seems to be dark and we can't see it.
  
- 3. You place a wood sheet between a light source and a wall.**  
The shadow of the wood sheet is formed on the wall, because light rays cannot pass through it.
  
- 4. Light falls on a transparent body such as a glass window.**  
Light passes through the glass window.
  
- 5. Light falls on a rough surface.**  
Light rays are reflected in different directions.
  
- 6. A firefly beetle wants to attract a mate to reproduce.**  
It produces a chemical reaction inside its body to light up and attract a mate.
  
- 7. The traffic light becomes red while you are going to cross the road.**  
The eyes send a message to my brain to stop walking and not cross the road.

**5 Comparisons****1. Opaque objects and transparent objects.**

Opaque objects	Transparent objects
<ul style="list-style-type: none"> <li>- They are objects that don't allow light to pass through.</li> <li>- Things can't be seen through them.</li> </ul> <p><b>Examples :</b> rocks, wood, metals and the human body.</p>	<ul style="list-style-type: none"> <li>- They are objects that allow light to pass through.</li> <li>- Things can be seen through them.</li> </ul> <p><b>Examples :</b> air, water, glass windows and lenses.</p>

**2. Smooth surface and rough surface :**

Smooth Surface	Rough Surface
<ul style="list-style-type: none"> <li>- If the surface is <b>smooth</b> (such as a mirror), the light rays will reflect in one direction with the same angle at which they strike (hit) the object originally.</li> </ul> 	<ul style="list-style-type: none"> <li>- If the surface is <b>rough</b> (such as a painted surface), the reflected light rays will scatter or diffuse in different directions.</li> </ul> 

**6 Main points**

- Humans need more light to see clearly in the low-light places, and without it they will need a device known as "night vision goggles" to see in the dark.
- **Nocturnal animals** as fishing cats are better to see in the dark than humans, because they have :
  1. Big eyes.
  2. Wide eye pupils.
  3. Mirror-like membrane.
- The **mirror-like membrane** at the back of fishing cat's eyes is a structural adaptation which bounces off any little amount of light that falling on it.

- **Light travels in straight lines.**
- **Opaque objects** (including the human body) always form shadows because all the light rays either bounces off or is absorbed, so no light rays pass through the opaque objects.

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- **The reflected light depends upon the smoothness of the surface :**
  - If the surface is smooth (such as : a mirror), the rays will reflect in one direction at the same angle at which they strike the object originally.
  - If the surface is rough (such as a painted wall) the rays will scatter or diffuse in different directions.
- **Shiny and smooth materials** (such as : mirror and metal) reflect light better than **rough materials** (such as : plastic, wood, cloth and paper).

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- **How does light striking matter make it possible for humans and animals to see ?**

When light rays strike an object, light reflects (bounces) off this object.

The reflected light travels in a straight line into the eyes.

Special nerves in the eyes send messages to the brain.

The brain interprets the messages as an image of this object.

- **Humans and animals** use different ways to communicate with each other as sound and light.
- **Firefly beetles** produce different flash patterns to warn off from predators or to attract a mate to reproduce.
- **Humans** can communicate using language and can use codes to transfer information.

# Review on Concept (2.1)

## 1 Scientific terms (Definitions):

Scientific terms	Definitions
1. Motion :	It is any change in the position of an object relative to a fixed starting point.
2. Gravity :	It is the force that pulls objects down toward the Earth.
3. Force :	It is a push or pull that is applied to an object causes it to change its position.
4. Friction :	It is a force that is exerted when objects rub against each other.

## 2 Importance or uses:

Items	Importance or uses
1. Three jet engines in the Shockwave truck :	They make the Shockwave truck reach speeds more than 500 kilometers per hour.
2. Three parachutes in the Shockwave truck :	They help slow down the Shockwave quickly.
3. Fire extinguishers onto a cart :	They make the cart begins to move forward when they release air which moves backward.
4. Friction :	It always slows down or stops motion of moving objects.
5. Force :	It transfers energy from one object to another.

## 3 Give reasons for:

1. The Shockwave truck is faster than the normal truck.  
Because the Shockwave truck has three jet engines.
2. Engineers use parachutes in the Shockwave truck designs.  
To help slow down the Shockwave truck quickly.
3. When you kick a ball laying on the ground, it moves.  
Due to the pushing force of your leg that acts on it.

- 4. By increasing the number of fire extinguishers, the distance that the cart moves will increase.**

Because by increasing the number of fire extinguishers, the speed of the cart will increase.

- 5. When two equal pushing forces act on an object in opposite directions, the object doesn't move.**

Because the two forces are balanced, so the object doesn't move.

- 6. If you let a pen out of your hand, it falls to the ground.**

Due to the pulling force of the gravity down toward the Earth.

- 7. When your friend catches a ball that is thrown in the air, the motion of the ball is stopped.**

Due to the pushing force of his hand against the ball movement that makes it stops.

- 8. Parachutes are used in the Shockwave truck and rocket.**

To help slow down their movement.

- 9. When your toy car crashes into a wall, it will stop moving.**

Because the wall applied a force to the car with the same amount of the force that pushes the car toward the wall.

- 10. When you stop pedalling during the movement of your bicycle, it slows down until it stops.**

Due to the friction force between the bicycle tires and the road that acts in the opposite direction of the bicycle movement.

- 11. If you push two similar toy cars on the same ground, one of them may travel for a longer distance than the other.**

Due to the difference in the forces that act on each of them.

- 12. If the same force acts on a small car and a truck, the small car will travel for a longer distance than the truck.**

Because the small object travels faster than the bigger object when the same amount of force acting on them.

- 13. Any body moves on the ground is usually affected by a force opposes its direction of movement.**

Because there is a friction force between the moving body and the ground that acts in the opposite direction of the body movement. :

**4 What happens if ...?**

- 1. You kick a stopped ball on the ground.**  
It starts to move on the ground.
  
- 2. Engineers placed jet engines inside a normal truck instead of its normal engine.**  
It turns into the Shockwave truck and moves with high speed.
  
- 3. The Shockwave driver opens the parachutes.**  
The Shockwave truck starts to stop gradually.
  
- 4. The pulling force of one of the two teams in tug-of-war game becomes greater than the other team.**  
The team with greater force will win the game, because the rope will move toward the team of greater pulling force.
  
- 5. The pulling forces of the two teams are equal in the tug-of-war game.**  
The rope will not move because the two forces are balanced.
  
- 6. You let your toy out of your hand.**  
It will fall down on the ground due to the pulling force of gravity.
  
- 7. A car runs out of fuel on a flat road.**  
Its speed decreases gradually until it stops.
  
- 8. You push two similar balls with different forces on the ground.**  
The ball that is affected by the greater force will move a longer distance than the other ball.
  
- 9. A car and a truck are affected by the same pushing force.**  
The car travels a distance longer than the truck.

**5 Comparison:**

Pushing force	Pulling force
The force you can do to move an object away from you.	The force you can do to bring an object closer to you.
<b>Example :</b> A man pushes a wheelbarrow.	<b>Example :</b> A child pulls a toy car.

## 6 Main points

- The Shockwave truck contains three jet engines.
- The Shockwave truck is faster than the normal trucks.
- The Shockwave truck has three parachutes to help slow down it quickly.

---

- Air can move objects such as leaves on a tree that move by the wind blowing.
- When fire extinguishers onto a cart release air, the air moves backward that makes the cart moves forward.
- By increasing the number of fire extinguishers, the speed of the car increases and the distance that it moves increases too and vice versa.

---

- **There are two forces that cause objects to move which are :**
  1. Pushing force.
  2. Pulling force.
- If balanced forces act on an object, it will not move.
- If unbalanced forces act on an object, it will move toward the greater force.

---

- An object is in motion if its position changes from one place to another, even if this change can't be seen.
- Some motion is easy to see such as a person walking down the street.
- Some motion is hard to see such as the rotation of the Earth around the Sun.

---

- Moving object only stops when a force of the same amount is applied to it in the opposite direction of its motion.
- Friction force always slows down or stops motion of moving objects.
- The direction of friction force is always opposite to the direction of motion of a moving object.

---

- Hard push causes object to travel a long distance.
- Gentle push causes object to travel a small distance.
- **If the same force acts on a toy car and a toy truck :**
  - The car (the smaller object) will travel a farther distance.
  - The truck (the bigger object) will travel a shorter distance.

---

- Force transfers energy from one object to another.
- The work done is equal to the amount of energy transferred by a force that is used to move an object.

Force

Transfers

Energy

Enables us to do

Work

## 1 Scientific terms (Definitions) :

Scientific terms	Definitions
1. Energy :	It is the ability to do work or cause change.
2. Work :	It is a force that causes an object to move a distance.
3. Potential energy :	It is the amount of energy that is stored in an object due to its position.
4. Kinetic energy :	It is the energy of an object due to its motion.

## 2 Give reasons for :

1. The roller coaster doesn't need electricity during its movement down the hill.  
Because its stored potential energy changes into kinetic energy, that helps it move downward.
2. The speed of the roller coaster increases as it moves down the hill.  
Because its kinetic energy increases.
3. The goal net vibrates when a ball hits it.  
Because the kinetic energy of the ball transfers to the goal net.
4. A bird stops on a tree has energy.  
Because the bird is found at a height from the Earth's surface, so it has potential energy.
5. When a stone is thrown upwards, its potential energy increases.  
Because its height from the Earth's surface increases.
6. Electric lamp produces different forms of energy.  
Because it produces light and thermal energies.
7. On winding up the spring of a toy car, then let it free, the car moves.  
Because the potential energy which is stored in the spring changes into kinetic energy.
8. A sand surfer moves very fast down the sand slope.  
(according to the change of energy).  
Because his stored potential energy changes into kinetic energy.

**9. When a tennis ball is thrown upwards, its potential energy increases.**

Because its height from the Earth's surface will increase.

**10. The stored potential energy in a battery differs from that of a ball at the top of a hill.**

Because the battery stores chemical potential energy, while a ball at the top of hill stores gravitational potential energy.

**11. We can't live without eating food.**

Because burning of food produces kinetic energy to carry out different activities.

### 3 What happens ?

**1. To the energy of the roller coaster when it moves down the hill.**

Its stored potential energy changes into kinetic energy.

**2. To the roller coaster when it loses its kinetic energy.**

It cannot move, so it will stop.

**3. To the energy of a stopped ball at the top of a ramp starts to move down.**

Its stored potential energy changes into kinetic energy.

**4. To the potential energy of an object when it is placed at a height from the Earth's surface.**

The object has potential energy.

**5. To the energy of an apple falls from a tree to the ground.**

The potential energy of the apple changes into kinetic energy.

**6. To the potential energy of a book you transfer from the ground to a higher shelf.**

The potential energy of the book will increase.

**7. If you operate a washing machine. (according to the change of energy).**

The electrical energy changes into mechanical energy.

**8. If a boy moves down the slide. (according to the change of energy).**

The potential energy changes into kinetic energy.

**9. If you switch on an electric lamp. (according to the change of energy).**

The electrical energy changes into light and thermal energies.

**10. If food burns inside the human body.**

The stored chemical energy of food changes into kinetic energy so human can carry out different activities.

**11. If you put a battery inside a flashlight, then you switch.**

(according to the change of energy).

The stored chemical energy in the battery changes into light and thermal energies.

**4 Comparison**

Points of comparison	Potential energy	Kinetic energy
<b>Definition :</b>	It is the amount of energy that is stored in an object due to its position.	It is the energy of an object due to its motion.
<b>Forms :</b>	- Gravitational potential energy. - Chemical potential energy.	- Sound energy. - Light energy. - Electrical energy - Thermal energy.
<b>Example :</b>	The ball has potential energy stored in it when you lift it up away from the Earth's surface.	The ball has a kinetic energy when you let it fall down to the ground.

**5 Main points**

- The roller coaster has the most potential energy when it reaches the highest point of the hill. This energy changes into kinetic energy when the roller coaster moves down the hill.

---

- Energy is very important in our life and it is found everywhere around us.

---

- Energy can be stored and changed from one form into another.

---

- We cannot see most forms of energy but we can see and measure what energy can do.

---

- Scientists classify energy into two types which are potential energy and kinetic energy.

---

- When an object has potential energy, so this object is ready to do work or to be active.

**- Forms of potential energy :**

- Gravitational potential energy.
- Chemical potential energy.

**- Forms of kinetic energy :**

- Sound energy.
- Electrical energy.
- Light energy
- Thermal energy

**- Factors affecting potential energy of an object are :**

1. Mass where by increasing the mass of an object, the potential energy increases.
2. Height where by increasing the height of an object from Earth's surface, the potential energy increases.

**Energy can be**

**Transferred**

**Transformed (changed)**

- Energy is transferred from one place to another.
- Energy is continuously changing and transforming from one form into another form.
- Energy can be stored in many different forms.
- New energy cannot be created and also existing energy cannot be destroyed.
- When you eat food, your digestive system breaks down the food and changes it into energy stored in your body.

# Review on Concept (2.3)

## 1 Scientific terms (Definitions)

Scientific terms	Definitions
1. Speed :	It is the distance that an object travels in a certain amount of time.
2. Collision :	It is the bumping or crashing of two objects into each other.

## 2 Importance or uses :

Items	Importance or uses
1. Wrecking ball :	It is used to collide with walls of a building to help construction workers knock down walls or parts of buildings.
2. Seatbelts :	They are used in cars to keep the driver and also the passengers from moving forward when the car stops suddenly.
3. Airbags :	- They slow the speed of the driver's motion forward. - They absorb the energy of the passengers on collision.

## 3 Give reasons for :

### 1. Seatbelts in cars are very important.

Because the seatbelts are used in cars to keep the driver's body and also the passengers from moving forward when the car stops suddenly.

### 2. Airbags in cars are very important.

Because the airbags slow the speed of the driver moving forward and they absorb the energy of the passengers during collision.

### 3. The speed of the ball increases when the bat hits it hard.

Because the kinetic energy of the bat transfers to the ball.

### 4. The speed of a truck is more than that of a small car when both of them roll down on the same ramp.

Because the truck has mass more than of the small car, so the truck has speed and kinetic energy more than that of the small car.

### 5. When two objects collide with each other, you can hear a sound.

Because a part of kinetic energy changes into sound energy.

**6. Driving fast is very dangerous.**

Because if the car increases its speed, its kinetic energy increases that results in exerting a large force during an accident.

**7. A truck needs a bigger engine than that of a small car to move with the same speed.**

Because the truck has more mass than the car.

**8. A car consumes less fuel than that consumed by a bus to move at the same speed.**

Because the car has a smaller engine than the bus.

**9. You can hear a sound during collision between marbles.**

Because some of the kinetic energy changes into sound energy during collision.

**10. The amount of energy before collision is equal to the amount of energy after collision.**

Because the energy is conserved during the collision, so it cannot be destroyed.


**What happens if ...?**

**1. The moving cricket bat hits a ball.** (according to the transfer of energy).  
The kinetic energy of the bat transfers to the ball.

**2. Airbags in a car don't inflate during a crash.**

The energy of collision will push the driver forward strongly that causes many harms to him.

**3. The speed of a car increases.** (according to its kinetic energy).  
The kinetic energy of the car increases.

**4. We increase the angle of inclination of a ramp on which a toy car moves.** (according to the speed of the toy car).

The speed of the toy car will increase.

**5. Two bicycle move in an opposite direction, collide with each other.**  
The damage of the two bicycles would be much more severe.

**6. The pushing force that acts on an object decreases.** (according to its kinetic energy).  
Its kinetic energy will decrease.

**7. The kinetic energy of a moving car increases.** (according to the damage during collision).  
The damage would be much more severe.

**8. A truck and a small car move at the same speed.**

(according to Kinetic energy).

The kinetic energy of the truck is more than that of the small car.

**9. The Newton's cradle ball is raised up without leaving it go.**

(according to its energy).

It stores potential energy and doesn't have any kinetic energy.

**10. You let the ball of Newton's cradle move towards the rest of balls.**

(according to the change of energy).

The potential energy changes into kinetic energy.

**11. Friction occurs between the string and the other parts of Newton's cradle during collision.**

(according to the change of energy).

Some of kinetic energy changes into thermal energy.

## 5 Importance law :

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

### • Problems :

**1. Find the speed of a runner, if you know that he covers 400 meters in 80 seconds.**

$$\begin{aligned}\text{Speed} &= \frac{\text{Distance}}{\text{Time}} \\ &= \frac{400}{80} = 5 \text{ m/sec.}\end{aligned}$$

**2. Amir runs 100 meters in 20 seconds. Calculate the speed of Amir.**

$$\begin{aligned}\text{Speed} &= \frac{\text{Distance}}{\text{Time}} \\ &= \frac{100}{20} = 5 \text{ m/sec.}\end{aligned}$$

**3. If a bus traveled 600 kilometers in 5 hours. Calculate the speed of the bus.**

$$\begin{aligned}\text{Speed} &= \frac{\text{Distance}}{\text{Time}} \\ &= \frac{600}{5} = 120 \text{ km/hr.}\end{aligned}$$

**6 Comparison**

Fast-moving object	Slow-moving object
• It has more energy.	• It has less energy.
• When this object hits another object, it exerts more force.	• When this object hits another object, it exerts less force.
• This force causes a big damage to the object that cannot be repaired.	• This force causes less damage to this object than the fast-moving object.

**7 Main points**

- Common measuring units of speed :
  - Meter per second (m/sec).
  - Kilometer per hour (km/hr).

---

- The object that travels the greater distance in the same amount of time is moving at a greater speed.

---

- The object that travels the same distance in the smaller amount of time is moving at a greater speed.

---

- By increasing the force, mass and speed of an object, its kinetic energy increases.

---

- When two objects collide with each other :
  - An amount of energy transfers between them.
  - Changes of energy occur.

---

- During collision, there are changes of kinetic energy may be in the form of heat, light or sound.

---

- The amount of kinetic energy of an object depends on :
  - The mass of object.
  - The speed of object.

---

- Some of kinetic energy in Newton's cradle changes into other forms of energy such as sound energy and thermal energy.

## FINAL EXAMINATIONS:

- El-Moasser Final Examination Models.
- Final Examinations of some Governorates.

3  
PART



# الجوابات

## ١ (A) Choose the correct answer :

1. The roots of kapok tree don't grow deeply in the soil, because ....  
a. the soil contains less water.      b. the soil contains more water.  
c. the climate is very cold.      d. the climate is very hot.
2. The system responsible for moving your hand away from danger, such as touching a hot cup of tea, is the ..... system.  
a. digestive      b. respiratory      c. nervous      d. stomach
3. Songs of humpback whales in winter are characterized by each of the following, except .....  
a. it is for mating season.      b. moving better through cold water.  
c. having soft sounds.      d. having low-pitched sounds.
4. When you move something toward you, this represents .....  
a. pushing force. b. light energy.      c. pulling force.      d. sound energy.

## (B) Give a reason for the following :

Seatbelts in cars are very important.

.....

## ٢ (A) Put (✓) or (✗) :

1. Digestion process begins in stomach with the help of saliva. ( )
2. Some animals have extra abilities that humans do not have, and these extra abilities are called super sensory adaptations. ( )
3. Cats have excellent night vision, while humans are not. ( )
4. The bus that covers 60 kilometers in 1 hour has a speed = 60 m/sec. ( )

## (B) What happens to ...?

The kinetic energy of a moving car if its speed increases.

.....

## ٣ (A) Write the scientific term of each of the following :

1. The part of the kapok tree which is supported by the buttress roots. (.....)
2. It delivers messages between the spinal cord and different body organs. (.....)

3. It is the force that is exerted when objects rub against each other. (.....)
4. One of the measuring units of time. (.....)

(B) Find the speed of a runner, if you know that he covers 300 meters in 30 seconds.

.....

### Model Exam 2

1 (A) Complete the following sentences :

1. Engineers use ..... to slow down the motion of the Shockwave train.
2. The speed affects the ..... energy of a moving object.
3. In the electric bell, ..... energy changes into ..... energy.
4. Most animals can hunt when ..... energy bounces off a prey into their eyes, while bats can hunt when ..... energy bounces off a prey into their ears.

(B) Give a reason for the following :

When your friend catches a ball that is thrown in the air, the movement of the ball is stopped.

.....

2 (A) Correct the underlined words :

1. Exhausts from factories and floods produce smog, that causes air pollution. (.....)
2. The energy that is produced due to the friction between the string and other parts of Newton's cradle, is the sound energy. (.....)
3. Hearing is one of the weak senses of jerboa. (.....)
4. The friction between the car's windows and the road decreases the speed of the car. (.....)

(B) Classify the following materials into opaque objects and transparent objects :

"Wood – Air – Water – Metal – Lenses"

Opaque objects	Transparent objects
.....	.....
.....	.....
.....	.....
.....	.....

**3 (A) Write the scientific term of each of the following :**

1. A group of ants which is responsible for sending smelly messenger, when there is a shortage of food. ( )
2. It is the force that pulls objects toward the center of the Earth. ( )
3. A structure that prevents the loss of water in the pine tree. ( )
4. The organ used to differentiate between different scents. ( )

**(B) A truck travels a distance of 160 kilometers in 2 hours. Find its speed.**

### Model Exam | 3

**1 (A) Choose the correct answer :**

1. Which of the following sentences describes the friction force ? .....
  - a. It pulls objects toward the ground.
  - b. It pushes objects away from the ground.
  - c. It slows down or stops the moving objects.
  - d. It doesn't affect the moving objects.
2. In penguin's body, the insulating layer of fat and dense feathers protect its body from .....
  - a. cold air.
  - b. cold water.
  - c. warm water.
  - d. warm air.
3. The energy that is stored in an object due to its position, is known as .....
  - a. kinetic energy.
  - b. potential energy.
  - c. electrical energy.
  - d. chemical energy.
4. When you see a car coming toward you, the sensory receptors ..... to get away from it.
  - a. in the ears send a signal to the brain first
  - b. in the eyes send a signal to the brain first
  - c. in the eyes send a signal to sensory receptors in the ears
  - d. in the ears send a signal to sensory receptors in the eyes

**(B) Give a reason for the following :**

Mirror can reflect the light better than a painted surface.

**2 (A) Put (✓) or (✗) :**

1. The kinetic energy of a toy car pushed on a flat surface is equal to the kinetic energy of another toy car pushed with the same force down a ramp. ( )
2. The main difference between pulling and pushing forces is the direction of the force. ( )
3. Sharp spines are examples of adaptation of some plants to prevent animals from eating them. ( )
4. As the height of an object from the Earth's surface increases, its potential energy increases. ( )

**(B) Find the speed of a car that moves a distance of 240 Kilometers in 3 hours.**

.....  
.....  
.....

**3 (A) Write the scientific term of each of the following :**

1. They include the eyes, nose, ears, tongue and skin, and they receive information from the surroundings and send it to the brain. (.....)
2. They are present in car airbags, and allow them to deflate fast after collision. (.....)
3. A type of surface that reflects light in different directions when the light falls on it. (.....)
4. A large muscle that contracts during breathing in and relaxes during breathing out. (.....)

**(B) Classify the following living organisms according to their habitats into organisms live in deserts and organisms live in forests in the table below :**

(Starred agama lizard – Panther chameleon – Fennec fox – Kapok tree – Palm tree – Barbary fig plant).

Organisms live in deserts	Organisms live in forests
.....	.....
.....	.....
.....	.....

**Model Exam 4****1 (A) Write the scientific term of each of the following :**

1. A property that helps animals blend in with their surrounding environment. (.....)

2. A system that works inside the human body to keep the human away from danger. ( )

3. The energy that is used to operate television. ( )

4. The force that makes an object move a distance. ( )

**(B) Give an example for the following :**

A light source that presents in the sky.

**2 (A) Choose the correct answer :**

1. The potential energy of an object depends on

- a. its mass only.
- b. its height from the Earth's surface only.
- c. its mass and its height from the Earth's surface.
- d. its temperature.

2. .... is considered as a behavioral adaptation in the panther changes. ( )

- a. Puffing up its body during danger
- b. Each eye can move independently
- c. V-shaped feet
- d. Long sticky tongue

3. From the structural adaptation of water lily plant is that .....

- a. it has long roots.
- b. it has sharp spines.
- c. it has tiny leaves.
- d. it has wide leaves.

4. All of the following are examples of motion, except .....

- a. a running person.
- b. a ball travelling through the air.
- c. a flying bird.
- d. a sleeping dog.

**(B) What happens if ...?**

Humans stop throwing waste materials into waterways and soil in an ecosystem.

**3 (A) Correct the underlined words :**

1. The balanced forces cause the object to move. (.....)

2. When you turn on a radio, the electrical energy changes into light energy. (.....)

3. Potential energy depends on the speed of an object. (.....)

4. The system that works with the eyes of living organisms for seeing objects is the digestive system. (.....)

**(B) A deer runs a distance of 200 meters in 5 seconds. Calculate its speed.**

## Model Exam | 5

**1 (A) Choose the correct answer :**

1. When a car suddenly stops, the passengers move .....  
a. backward.      b. forward.      c. upward.      d. downward
2. Reading and writing are common types of communication in ...  
a. humans      b. animals      c. birds      d. plants
3. Bears that live in forests have fur ..... that of polar bears.  
a. whiter than      b. darker than  
c. similar to      d. brighter than
4. When the roller coaster stops, its energy of motion .....  
a. doesn't change.      b. increases.  
c. decreases.      d. becomes zero.

**(B) What happens if ...?**

The length of acacia taproot doesn't exceed 3 meters downward.

.....

.....

**2 (A) Put (✓) or (✗) :**

1. At night, cat's eyes look like small lighted lamps. ( )
2. The sandy-colored fur of caracal helps it blend in with snow in polar environment. ( )
3. After car collision, the airbags deflate as fast as they inflate. ( )
4. The stopped object can't move until a force acts on it. ( )

**(B) Look at the following pictures, then choose if the forces are "balanced" or "unbalanced" :**

1. A book on a table  
(Balanced – Unbalanced)



2. A seesaw  
(Balanced – Unbalanced)

**3 (A) Write the scientific term of each of the following :**

1. A type of foxes that has sandy-colored fur to adapt its desert environment ( )
2. It is the force that pulls objects toward the center of the Earth ( )
3. Safety equipment used to provide soft cushion, when it is inflated automatically with a gas during collision of cars. ( )
4. A plant lives in salt water habitat and has long, strong roots to reduce the water waves. ( )

**(B) Give a reason for the following :**

Branches of acacia tree are gathered on the top of its trunk.

.....

.....

**1 (A) Choose the correct answer :**

1. All the following properties are considered as structural adaptations in the panther chameleon, except .....  
 a. each eye can move independently.  
 b. opening its mouth wide at danger.  
 c. V-shaped feet. d. long sticky tongue.
2. When an object is in motion, this means that its ..... changes.  
 a. color b. shape c. size d. position
3. Pine tree has a triangular shape to make snow slides over its branches without breaking it. This structural adaptation makes this tree face the extreme cold climate like the feet of .....  
 a. caracal. b. penguin. c. fennec fox. d. brown bear.
4. If there is nothing to stop the movement of an object, this object will .....  
 a. stay in motion. b. suddenly stop.  
 c. stop after few minutes. d. stop after few seconds.

**(B) Give a reason for the following :**

Some animals have the ability to make camouflage adaptation.

.....

**2 (A) Put (✓) or (✗) :**

1. Unbalanced forces keep an object in its place without moving. ( )
2. The moving objects only have energy, while the objects that don't move have no energy. ( )
3. In penguin's feet, the cold blood vessels can warm up the warm blood vessels. ( )
4. The moon is not considered as a light source. ( )

**(B) Classify the following animals in the table below :**

(Fishing cat – Dolphin – Owl – Bat)

Animals have super sight sense	Animals have super hearing sense
.....	.....

**3 (A) Write the scientific term of each of the following :**

1. An organ in the human digestive system that has tiny blood vessels to absorb the nutrients through its walls. ( .. .... )
2. A feature in the bull shark, in which the upper surface of its body is darker than its lower surface. ( .. .... )
3. The ability to do work or cause a change. ( .. .... )
4. The organ used to differentiate between the taste of different types of food. ( .. .... )

**(B) Amir rides his bike and covers a distance of 150 meters in 5 seconds.**

Calculate the speed of the bike.

.....

.....

### Model Exam 7

**1 (A) Choose the correct answer :**

1. Camouflage means that the animal ...
  - a. can be seen easily among its surrounding.
  - b. is hard to be seen among its surrounding.
  - c. is easily to be seen by its preys.
  - d. can be seen easily by its predators.
2. The five senses of humans and animals include ...
  - a. sight, hearing, touch, smell, and movement.
  - b. sight, movement, taste, touch, and smell.
  - c. taste, touch, movement, hearing, and smell.
  - d. sight, hearing, taste, smell, and touch.
3. When an object moves down a ramp, its stored energy ...
  - a. increases.
  - b. doesn't change.
  - c. changes to a less active form of energy.
  - d. changes to a more active form of energy.

4. The structural adaptation that helps the fishing cat to catch a prey at night is that
- it can feel the heat of prey's body
  - it can hide inside the forest
  - it can digest its prey easily
  - it has a mirror-like membrane at the back of its eyes.

(B) What happens if ...?

Friction occurs between the object and another surface due to contact, resulting in a change in motion.

2 (A) Put (✓) or (✗) :

- Being exposed to air and dust for a long time damages the respiratory system. (✓)
- If two objects travel for equal periods of time, the object that moves a greater distance has a slower speed. (✗)
- When an object moves faster, it gains larger amount of kinetic energy. (✓)
- Camouflage helps animals adapt the extreme weather conditions in their ecosystems. (✓)

(B) Find the speed of a horse, if you know that it covers 250 meters in 5 seconds.

3 (A) Write the scientific term of each of the following :

- A process through which the body gets oxygen from the air and expels out carbon dioxide. (\_\_\_\_\_)
- An animal that has different bright colors to provide camouflage in its environment and has V-shaped feet. (\_\_\_\_\_)
- The energy of an object due to its motion. (\_\_\_\_\_)
- The energy that is stored in food and batteries. (\_\_\_\_\_)

(B) Give a reason for the following :

It is very dangerous to live in an ecosystem that has a high level of air pollution.

Model Exam 8

1 (A) Put (✓) or (✗) :

- A moving object is not affected by friction force. ( )

2. Some animals prefer hunting during the night than hunting during the day. ( )
3. The object that travels down a ramp is affected by the force of gravity. ( )
4. Eyes are one of the five senses, on which humans and animals depend on to see the surroundings. ( )

**(B) Give a reason for the following :**

The measuring unit of speed is km/hr or m/sec.

**2 (A) Choose the correct answer :**

1. If the angle of inclination of a ramp increases, the kinetic energy of an object moving down it will .....
  - a. decrease.
  - b. increase.
  - c. remain as it is.
  - d. be destroyed.
2. The mirror-like membrane present at the back of eyes of .....
  - a. humans only.
  - b. cats only.
  - c. both humans and cats.
  - d. neither humans nor cats.
3. Umbrella-shaped trees include .....
  - a. mangrove tree and acacia tree.
  - b. mangrove tree and kapok tree.
  - c. acacia tree and kapok tree.
  - d. barbary fig and water lilies.
4. Fennec foxes and arctic foxes live in burrows, this belongs to ..... adaptation.
  - a. only structural
  - b. only behavioral
  - c. both structural and behavioral
  - d. neither structural nor behavioral

**(B) A train travels from Cairo to Alexandria for a distance of 220 kilometers in 2 hours. Find its speed.**

**3 (A) Correct the underlined words :**

1. As the mass of a car increases, the damage that occurs during its collision decreases. (.....)
2. Air enters the mouth of fish and then passes across its gills. (.....)
3. The sense of eyesight of owls is weaker than that in bats. (.....)
4. Groups of ants within a colony have similar roles. (.....)

**(B) What happens if ...?**

The amount of food in the ant's colony decreases.

**Model Exam 9****1 (A) Complete the following sentences :**

1. The sight sense can be performed through ..... and .....
2. When two cars move on the same road, car (A) moves at speed equals 10 m/sec., and car (B) moves at speed equals 20 m/sec, this means that car ..... moves longer distance than car ..... in the same time.
3. Humans, amphibians and reptiles have ..... to breath oxygen gas in. vit.
4. Among safety equipment used during collision of cars are ..... and .....

**(B) Give a reason for the following :**

If you push two similar toy cars, one of them may travel for a longer distance than the other.

.....

.....

**2 (A) Put (✓) or (✗) :**

1. As human needs clean water to drink, fish needs clean air to breathe. ( )
2. Seatbelt is one of the safety equipment in cars. ( )
3. Animals communicate with each other by using different senses. ( )
4. The desert lizard blend in with large green trees, to hide from its enemies. ( )

**(B) Find the speed of a runner, if you know that he covers 400 meters in 20 seconds.**

.....

.....

**3 (A) Choose the correct answer :**

1. All the following sentences about energy are correct, except .....
  - a. it can be stored in an object.
  - b. it can be transferred from an object to another one.
  - c. it can be transformed from one form into another one.
  - d. it can be destroyed and cannot be created.
2. The blind person's cane and ..... emit a high-pitched sound that bounces off objects forming an echo.
 

a. lizards	b. polar bears	c. bull sharks	d. bats
------------	----------------	----------------	---------
3. Speed is a measurement of how ..... something is moving.
 

a. long	b. tall	c. fast	d. heavy
---------	---------	---------	----------
4. A very big truck needs ..... to move.
 

a. very small engine	b. small engine
c. very big engine	d. no engine

(B) Write the senses that can be used in each of the following types of communication in the table below :

Types of communication	The used senses
1. Watching TV.	.....
2. Flashing lights of fireflies.	.....
3. Echolocation in dolphins.	.....
4. Using the cell phone.	.....

### Model Exam | 10

1 (A) Choose the correct answer :

1. Humans and cars are .....
  - a. not able to produce sound energy.
  - b. not able to produce kinetic energy.
  - c. similar in obtaining energy to move.
  - d. similar in adaptation to live and survive.
2. Push or pull actions are considered as types of .....
  - a. force.
  - b. device.
  - c. energy.
  - d. adaptation.
3. The nervous system can do all the following functions, except .....
  - a. gathering information.
  - b. processing information.
  - c. sending signals.
  - d. falling of rains.
4. The speed of an object is measured in ..... or meters per second.
  - a. kilograms per hour
  - b. grams per second
  - c. kilometers per hour
  - d. kilograms per kilometers

(B) Give a reason for the following :

The spinal cord plays an important role in the nervous system to do its function.

.....

.....

2 (A) Complete the following sentences :

1. When you push a table on the floor, the ..... transfers from your body to the table.
2. Echolocation property is used by ..... and ..... animals to locate their preys.

3. Most of ..... energy in the Newton's cradle is transferred from the first ball to the rest of balls.

4. To increase the ..... energy of any moving object we must increase its weight.

(B) A car moves forward a distance 100 kilometers in time equals 2 hours. Calculate the speed of the car.

**3 (A) Put (✓) or (✗) :**

1. If two objects cover the same distance in the same time, so they have the same speed. ( )
2. In a complete dark room, you can use the senses of touching, tasting, smelling and hearing only. ( )
3. The moving objects only have energy, while the objects that don't move have no energy. ( )
4. We cannot create a new form of energy, and also we cannot destroy an existed form of energy. ( )

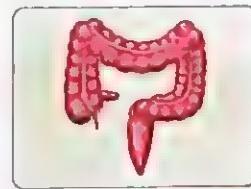
(B) You have some pictures of different parts of the human body. Write down the organ number in front of the system to which it belongs in the following table :



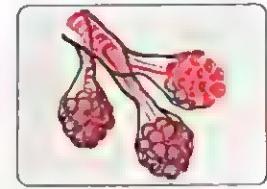
(1)



(2)



(3)



(4)

System name	Organ number
1. Digestive system :	.....
2. Respiratory system :	.....
3. Nervous system :	.....



## **Final Examinations of some governorates**

on the first term  
2023



### **Salvo Gavotinote**

New Cairo Educational Zone

### **1 (A) Complete the following :**

1. Fireflies use the sense of ..... to communicate with each other.
  2. ..... and ..... are from sharp senses in owls.
  3. In electric heater, ..... energy changes into ..... energy.
  4. A ball at the top of a hill stores ..... energy.

**(B) Give a reason for the following :**

Dolphin can hear all kinds of sound.

a) Write the scientific term :

1. One of the safety equipment in the car. (.....)  
2. It is the visible form of energy. (.....)  
3. It is a type of force that makes objects move away from you. (.....)  
4. It is a tree that is found in snow and has a triangle shape. (.....)

**(B) Compare between :**

Point of comparison	Polar bear	Forest bear
Fur color :	.....	.....

**3 (A) Choose the correct answer :**

1. Reading and writing are common types of communication in ..... world.  
a. humans                      b. animals                      c. birds
  2. ..... are animals that become active at night.  
a. Reptiles                      b. Amphibians                      c. Nocturnal animals
  3. The friction force produces ..... energy.  
a. thermal                      b. chemical                      c. electrical
  4. When a car stops suddenly, the passengers move .....  
a. forward.                      b. upward.                      c. downward.

### **(B) What happens if ...?**

**Animals can't adapt in their environment.**

**2****Close Government****East Nasr City Educational Zone****1 (A) Choose the correct answer :**

1. Reading and writing are common types of communication between  
a. animals.      b. humans.      c. plants.      d. birds.
2. When an object is in motion, this means that its      changes  
a. color      b. shape      c. position      d. size.
3. Which of the following can turn its head in all directions  
a. lizards.      b. owls.      c. cats.      d. cow.
4. When you move something toward you, this represents  
a. pulling force.      b. light energy.      c. pushing force.      d. sound energy.

**(B) Write the scientific term :**

The objects which allow light to pass through them. ( . . . )

**2 (A) Put (✓) or (✗) :**

1. Seatbelt is one of safety equipment in cars. ( )
2. The ears of arctic fox are longer than those of fennec fox. ( )
3. Exhaled air carries oxygen. ( )
4. Gravity pulls objects downward. ( )

**(B) What is the type of adaptation ... ?**

Panther chameleon puffs up its body with air for defense.

**3 (A) Complete the following sentences using the words between brackets:**

1. Fish breathe oxygen gas dissolved in water by ..... (skin – gills)
2. The organ that is responsible for sight ..... (eye – ear)
3. If the speed of object decreases, this means that its kinetic energy ..... (increases – decreases)
4. The form of energy that can be seen is ..... (light – sound)

**(B) What happen if firefly beetles want to communicate ?**

3

## Cairo Governorate

El-Sahel Educational Zone

## 1 (A) Choose the correct answer :

1. Animals that are active at night are called ..... animals.  
a. diurnal      b. nocturnal      c. endangered      d. extinct
2. The ability to rotate head in all directions is well-known in .....  
a. owl.      b. jerboa.      c. snake.      d. dolphin.
3. There is a ..... force between the car's tires and the road that decreases its speed gradually.  
a. gravity      b. friction      c. push      d. pull
4. ..... is the ability to do work or make a change.  
a. Speed      b. Work      c. Energy      d. Displacement

## (B) Mention the type of adaptation of fennec fox during its panting.

This type of adaptation is ..... adaptation.

## 2 (A) Match :

(A)	(B)
1. Kapok	a. is the covered distance in a unit of time.
2. Jerboa	b. grow in amazon rainforest.
3. Potential energy	c. it hops in zigzag path.
4. Speed	d. is the stored energy in the object due to its position.

1. .... 2. .... 3. .... 4. ....

## (B) Mention the importance of gills for fish.

.....

## 3 (A) Correct the underlined words :

1. The eye pupil in human open wider than that in the nocturnal animals. (.....)
2. Stomach is the main control center in the human body. (.....)
3. The kinetic energy increases by increasing the height of the moving object. (.....)
4. Pushing force of gravity makes the ball falls down after throwing it in air. (.....)

## (B) Write a name of an animal that lives in water and communicate by songs.

.....

**4****Calligraphy**

Al Salam Educational Zone

**1 (A) Complete the following sentences using these words :**

(acacia tree – energy – pushing – hearing)

1. Blind people can locate his friend by ..... sense.
2. It is the ability to do work and it can change from one form to another is called .....
3. From plants that have a long root that grows directly downward to search for water as deep as 35 meter below the soil surface .....
4. There are two forces that affect on a moving object which are ... and pulling forces.

**(B) Who am I ...?**

An insect that depends on smell sense when there is a shortage of food or if there is a danger nearby.

**2 (A) Put (✓) or (✗) :**

1. From the examples of kinetic energy, the bird which stays in its nest. ( )
2. We can determine the sound pitch by smelling sense. ( )
3. The moon is a source of light, as it reflects sunlight. ( )
4. The stopping object can't move until a force acts on it. ( )

**(B) Write the scientific term of each of the following :**

A reptile that its body is covered by colored scales and has v-shaped feet.

(.....)

**3 (A) Choose from column (A) when suits it in column (B) :**

(A)	(B)
1. Diaphragm	a. gravity force.
2. Kinetic energy	b. has a role in respiration.
3. The force that attracts bodies toward the Earth	c. airbag.
4. From safety equipment in cars	d. it can be transformed into potential energy.

1. .... 2. .... 3. .... 4. ....

**(B) A train travels from Cairo to Alexandria in a distance of 200 kilometers in 2 hours. Find its speed.**



**6****Giza Governorate****6<sup>th</sup> October Educational Zone****1 (A) Choose the correct answer :**

1. Bull sharks can live in .....  
a. fresh water.      b. salt water.      c. both.
2. Speed is a measurement of how ..... something is moving.  
a. long      b. fast      c. tall
3. ..... is a behavioral adaptation in acacia tree.  
a. Very long root      b. Sharp spines      c. Production poison
4. A ball at the top of the hill stores ..... energy.  
a. potential      b. sound      c. kinetic

**(B) Give a reason for the following :**

A mirror can reflect the light better than a painted surface.

.....

.....

**2 (A) Put (✓) or (✗) :**

1. Bats use their sense of smell to avoid dangers. ( )
2. The brain is responsible for processing information. ( )
3. Energy can be changed from one form to another. ( )
4. Gravity force is an upward pulling force. ( )

**(B) Write the function of the teeth :****3 (A) Choose from column (B) what suits it in column (A) :**

(A)	(B)
1. Its body is covered with thick fur	a. food.
2. It makes the food soft	b. polar bear.
3. Human needs energy from	c. owl.
4. has a bowl shaped face	d. saliva.

1. ....

2. ....

3. ....

4. ....

**(B) What happens if ...?**

A speed of a car increases. (according to its kinetic energy).

.....

**1 (A) Choose the correct answer :**

1. The potential energy of an object, depends on
  - a. its mass only.
  - b. its height from the Earth's surface only
  - c. its mass and its height from the Earth's surface
  - d. its temperature.
2. .... is considered as a behavioral adaptation of a ....
  - a. Puffing up its body during danger
  - b. Each eye can move independently
  - c. V-shaped feet.
  - d. Long sticky tongue.
3. From the structural adaptation of water lily plant is that
  - a. it has long roots.
  - b. it has tiny leaves.
  - c. it has sharp spines.
  - d. it has wide leaves.
4. All of the following are examples of motion, except ...
  - a. a running person.
  - b. a ball travelling through the air.
  - c. a flying bird.
  - d. a sleeping dog.

**(B) Write the scientific term :**

The organ responsible for processing information transmitted to it, then send messages to the sensory organs. (.....)

**2 (A) Correct the underlined words :**

1. The balanced forces cause the object to move. (.....)
2. When you turn on a radio, the electrical energy changes into light energy. (.....)
3. Moon is considered as a source of light. (.....)
4. The system that breaks down food into a simpler form is the respiratory system. (.....)

**(B) Give a reason for the following :**

Kapok tree has hand-shaped leaves

.....

**3 (A) Put (✓) or (✗) :**

1. Digestion process begins in stomach with the help of saliva. ( )
2. Speaking, writing are ways to communicate with people. ( )
3. Hitting a tennis ball needs a pulling force. ( )
4. The bus that covers 60 kilometers in 1 hour has a speed = 60 m/sec. ( )

**(B) Cross the odd word out :**

Eyes – Nose – Skin – Taste.

(.....)

**8****Activity Questions**

El-Montazah Educational Zone

**1 (A) Choose the correct answer :**

1. .... passes the food from pharynx to stomach.  
a. Esophagus      b. Stomach      c. Trachea      d. Aireoli
2. Paper and wood are ..... materials  
a. opaque      b. transparent      c. liquids      d. glasses
3. Penguin's feet have blood vessels that bring ..... from air to his feet.  
a. warm blood      b. cold blood      c. warm water      d. cold water
4. ..... produce high pitched sound during winter  
a. Owls      b. Humpback whales  
c. Toads      d. Salamanders

**(B) Cross the odd word :**

Nose – Trachea – Stomach – Lungs.

(.....)

**2 (A) Choose from column (B) what suits it in column (A) :**

(A)	(B)
1. Water lily	a. its habitat is salt water.
2. Kapok tree	b. its habitat is fresh water.
3. Pine tree	c. its habitat is Amazon rainforest.
4. Mangrove tree	d. its habitat is snow.

1. ....

2. ....

3. ....

4. ....

**(B) Write the scientific term :**

Ants send a smelly message to alert the ants where to find the food.

(.....)

**3 (A) Put (✓) or (✗) :**

1. In the electric fan, the electrical energy changes into kinetic energy. ( )
2. The fennec fox has short ear. ( )
3. Potential energy is the energy of moving body. ( )
4. Light travels in straight lines. ( )

**(B) Give a reason for the following :**

The body of chameleon is covered with colored scales.

9

**1 (A)** Complete the following sentences using the words below :

(Acacia tree – oxygen – mouth – sound)

1. In electric bell, electrical energy changes into ..... energy.
2. Digestion of food starts in the .....
3. Fish breathe ..... gas which dissolved in water.
4. ..... has taproot to search for water.

**(B) Give a reason for the following :**

Wood is considered as an opaque material.

**2 (A)** Put (✓) or (✗) :

1. When a car crashes into a wall, it will not stop. ( )
2. We eat food to obtain energy. ( )
3. Amphibians include frogs and salamanders. ( )
4. Black bears have dark fur to hide among trees. ( )

**(B) Cross the odd word out :**

Taste – Smell – Hearing – Eyes. (.....)

**3 (A)** Choose the correct answer :

1. When an object moves down a ramp, its stored potential energy .....
  - a. increases.
  - b. doesn't change.
  - c. changes to a less active form of energy.
  - d. changes to a more active form of energy.
2. The form of energy that can be seen is ..... energy.
  - a. thermal
  - b. electrical
  - c. sound
  - d. light
3. Which of the following can turn its head in all directions ? .....
  - a. Lizard.
  - b. Cat.
  - c. Owl.
  - d. Snake.
4. When an object is in motion, this means that its ..... changes.
  - a. position
  - b. shape
  - c. color
  - d. volume

**(B) Write the scientific term :**

The ability to do work. (.....)

**10****Sharjah International****Kafr Saqr Educational Zone****1 (A) Choose the correct answer :**

1. The body of arctic fox covered with .....  
a. skin.      b. thick fur.      c. feathers.      d. scales.
2. The ability to do work is .....  
a. energy.      b. force.      c. pull.      d. push.
3. Fish breathe oxygen dissolved in water by .....  
a. lungs.      b. gills.      c. skin.      d. fins
4. By increasing the speed of moving object, the kinetic energy will .....  
a. increase.      b. decrease.      c. still constant.      d. be slower.

**(B) What is the importance of sharp spines in the desert plants ?****2 (A) Put (✓) or (✗) :**

1. Both human and animal need light to see. ( )
2. Respiratory system is the system responsible for entering air to the body. ( )
3. Speed is the physical quantity measured by kilogram. ( )
4. Objects fall down to the Earth due to friction force. ( )

**(B) In your opinion, which of the following has thick fur ? and why ?**

Dogs live in cold weather or dogs live in hot weather.

**3 (A) Complete the following sentences :**

1. Eyes send message to ..... through nerves.
2. The energy which is stored in a ball at the top of a hill is ..... potential energy.
3. The force that causes falling objects toward the Earth is ..... force.
4. When the fuel runs out, the car decreases its speed due to ..... force.

**(B) Give a reason for the following :**

Bats can't see at night but it can hunt the prey.

11

**1** (A) Choose the correct answer :

1. Which of the following is a measuring unit of speed ? .....  
a. hr/km.      b. sec/m.      c. kg/sec.      d. m/sec.
2. The ability to do work is .....  
a. energy.      b. force.      c. push.      d. pull.
3. The chemical energy stored in batteries is considered a form of .....  
a. potential energy.      b. kinetic energy.      c. heat energy.      d. light energy.
4. An animal that has the ability to turn its head in all directions is .....  
a. snake.      b. jerboa.      c. dolphin.      d. owl.

**(B)** Calculate the speed of a train that covers 600 kilometers in a time of 6 hours.

.....  
 .....

**2** (A) Put (✓) or (✗) :

1. Wood is a transparent object that allows light to pass through it. ( )
2. The moon is a source of light. ( )
3. Some animals can see clearly at night. ( )
4. Exhaled air carries carbon dioxide. ( )

**(B)** Give a reason for the following :

Fennec fox has long ears.

.....  
 .....

**3** (A) Complete the following sentences choosing the correct word in the brackets :

(Wood – gills – Eye – Mangrove)

1. ..... is the organ that we can use to receive light.
2. ..... is an opaque object.
3. Fish have ..... to breathe.
4. ..... tree has long and strong roots to resist water waves.

**(B)** Give examples for :

Objects that are sources of light.

.....  
 .....

**12****SUPER COMPETITION****South Educational Zone****1 (A) Choose the correct answer :**

1. .... has the ability to turn the head in all directions.
  - a. Snake
  - b. Jerboa
  - c. Dolphin
  - d. Owl
2. All of the following are components of nervous system, except .....
  - a. spinal cord.
  - b. heart.
  - c. nerves.
  - d. brain.
3. The form of energy that can be seen is ..... energy.
  - a. thermal
  - b. electrical
  - c. light
  - d. sound
4. The force that is found between a moving car and the ground, which opposes its movement is known as .....
  - a. pushing force.
  - b. electrical energy.
  - c. magnetic energy.
  - d. friction force.

**(B) Give a reason for the following :**

The inhaled air is different from the exhaled air.

.....

**2 (A) Put (✓) or (✗) :**

1. We can see the movement of electricity through a wire. ( )
2. Thick white fur is an adaptation in bears that live in polar regions. ( )
3. As the height of an object from the Earth's surface increases, its potential energy decreases. ( )
4. Hitting a tennis ball needs a pulling force. ( )

**(B) What happens when the light falls on a smooth and shiny surface as mirror ?****3 (A) Complete the following sentences using the words below :**

(bats – increases – unbalanced – amphibians)

1. When the speed of an object increases, its kinetic energy .....
2. Echolocation is used by some animals as .....
3. Any object moves from its place when the forces acting on it are .....
4. Pollution of water causes a great problems for .....

**(B) Give one example for :**

1. A transparent material.
  2. An opaque material.
- .....

13

## Minta Governorate

Samalout Educational Zone

**1** (A) Put a sing (✓) or a sign (✗) to the following statements :

1. The force that attracts objects down to the Earth is called pushing force. ( )
2. Unbalanced forces cause a change in the object position. ( )
3. Thermal energy is an example of kinetic energy. ( )
4. We can measure the covered distance in kilometer unit. ( )

(B) Circle the different word :

Fire – The moon – The Sun – The light bulb.

**2** (A) Complete the following sentences with a suitable word :

1. When the mass of an object increases, so its kinetic energy .....
2. The long ears of the fennec fox are example of ..... adaptation.
3. The energy that is stored in an object is called ..... energy.
4. Humpback whales communicate with each other with their ..... senses.

(B) What happens when ...?

The diaphragm muscle contracts and moves down.

**3** (A) Choose the correct Answer from the following :

1. One of the adaptations that helps the animal to protect itself from enemies .....  
a. camouflage.      b. extinction.      c. reproduction.
2. All of the following is a component of the nervous system, except .....  
a. brain.      b. spinal cord.      c. heart.
3. Ability to do work is .....  
a. energy.      b. pull.      c. push.
4. The speed of a car that travels 300 kilometer in 3 hours is ..... km/hr.  
a. 150      b. 50      c. 100

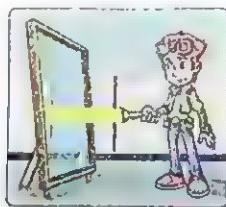
(B) Give a reason for the following :

The polar bear has thick white fur.

**14****Sabry Abo Hussien Language School****1 (A) Choose the correct answer :**

1. When you move something toward you, this represents .....  
a. pushing force.      b. light energy.      c. pulling force.      d. sound energy
2. Collisions usually produce .....  
a. solar energy.      b. sound energy.  
c. gravitational potential energy.      d. chemical potential energy.
3. In the electric lamp, electrical energy is changed into ..... energy  
a. sound      b. chemical      c. light      d. potential
4. The organ responsible for the sight sense is .....  
a. the ear.      b. the eye.  
c. the nose.      d. the tongue.

**(B) Look at the path of the light rays in picture (A) and (B), then determine which of the two objects is opaque and which is transparent :**



Object (A) .....



Object (B) .....

**2 (A) Put (✓) or (✗) :**

1. Dolphins have strong sight sense. ( )
2. Airbag absorbs the energy of the passengers during collision. ( )
3. The ears of arctic fox are longer than those of fennec fox. ( )
4. When a pen falls down from your hand, the acting force is the gravity. ( )

**(B) Answer the following :**

Jarboa have long and strong hind legs that help them to jump quickly and escape in dangerous times. Determine the type of adaptation.

.....

**3 (A) Complete the following sentences :**

1. ..... is the ability to do work.
2. Humpback whales communicate with each other through ..... sense.
3. By increasing the speed of an object, its kinetic energy .....
4. Fish respire ..... dissolves in water.

**(B) Cross out the odd word :**

Penguin – Polar bear – Snake – Arctic Fox.

(.....)

15

Luxor Governorate

Abu Bakr Official Language School

**1 (A) Choose the correct answer :**

1. How can we calculate the speed of an object ? .....  
 a. Speed = distance + time      b. Speed = distance × time  
 c. Speed = distance + time      d. Speed = distance – time
2. When you throw a ball in the air, the gravity will make it move .....  
 a. upward.      b. forward.      c. downward.      d. backward.
3. The organ which stores solid wastes until it is released outside body is .....  
 a. stomach.      b. small intestine.      c. large intestine.      d. anus.
4. The chemical energy stored in batteries is considered a form of .....  
 a. potential energy.      b. kinetic energy.  
 c. thermal energy.      d. light energy.

**(B) A roller coaster moves from up to down (Explain the energy changes) :**

.....  
.....

**2 (A) Match between column (A) and column (B) :**

(A)	(B)
1. Motion	a. the ability to do work.
2. Work	b. the change in object position relative to a fixed point.
3. Energy	c. the force that causes object to move.
4. Gas oven	d. it converts chemical energy into thermal energy.

1. .... 2. .... 3. .... 4. ....

**(B) What happens if ... ?**

Diaphragm moves up in respiration process.

.....

**3 (A) Write the scientific term :**

1. Time taken by organism to respond to different information. (.....)
2. A form of energy that the object has due to its movement. (.....)
3. A heavy steel ball swings on a cable used in buildings destruction. (.....)
4. It covers the body of some bears to keep warm and blend in snow. (.....)

**(B) Give a reason for :**

Airbag deflates after seconds of collision.

.....

1

Cairo Governorate



Nasr City Educational Zone

1 Put (✓) or (✗) in front of the following statements :

1. Exhaled air carries oxygen. ( )
2. A person can identify spoiled food through the touch sense. ( )
3. The migration of birds to search for food is considered as form of behavioral adaptation. ( )
4. The skin is the sensory organ that makes you feel the smoothness of the cloth. ( )

2 Complete the following sentences:

1. The eye sends messages to ..... through the nerves.
2. Bats use ..... as a means of communication with each other.
3. The spinal cord is an important organ of the ..... system.
4. A tube with muscles that helps to push food into the stomach, is called .....

3 Choose the correct answer :

1. One of the behavioral adaptations that helps the animal protect itself from enemies .....  
a. camouflage.    b. extinction.    c. migration.    d. reproduction.
2. Animals can communicate with each other through .....  
a. sounds and lights.    b. talking.    c. reading.    d. writing.
3. Which of the following allows the light to pass through it ? .....  
a. A rock.    b. Moon.    c. Wood.    d. Glass.
4. Which of the following is a source of light ? .....  
a. Eye.    b. Moon.    c. Fire.    d. Mirror.

4 (A) A dolphin can locate living organisms and things under the surface of the water. Explain why?

(B) Give one example :

An nocturnal animal that depends on its sense of heat to get its prey.

**1** Choose the correct answer :

1. Raising the thumb up or lower it down is a kind of .....  
a. colors.      b. codes.      c. waves.      d. lights.
2. Bats are ..... animals.  
a. nocturnal      b. morning      c. not hearing      d. not flying
3. If a car covered a distance of 10 meters in a time of 2 seconds, so the speed of the car is .....  
a. 50m/sec.      b. 20m/sec.      c. 20m/sec.      d. 5m/sec.
4. The roots of palm plants help them to .....  
a. stand strong against the wind.      b. reach the underground water.  
c. fixing plants in the soil.      d. all the above.
5. The force that causes an object to move a distance is called .....  
a. work.      b. potential.      c. gravity.      d. pull.

**2** Put (✓) or (✗) :

1. The respiratory system is responsible for the entry of air into the body. ( )
2. Dolphins have a strong sight sense. ( )
3. Wood is a transparent object that allows light to pass through it. ( )
4. The seesaw moves up and down because the forces that act on it are unbalanced. ( )
5. The force that slows down or decreases the speed of an object is gravity. ( )

**3** (A) Write the scientific term of each of the following :

1. It is the gained energy during the motion of objects. (.....)
2. A measuring unit for long distances. (.....)
3. A type of adaptation that helps an animal to hide. (.....)

## (B) 1. Give a reason for the following :

Some dogs live in a cold environment, while other dogs live in a hot environment. In your opinion, which of them have thick fur ? And why ?

.....

## 2. Give two examples :

Objects that are considered as sources of light.

.....

## 1 Choose the correct answer.

1. One of the behavioral adaptations that helps the animal protect itself from enemies .....  
a. camouflage. b. extinction.  
c. immigration. d. reproduction.

2. ..... is covering the body of arctic fox.  
a. Heavy clothes b. Heavy skin  
c. Thick fur d. Many feathers

3. ..... are panting to lower their body temperature.  
a. Whales b. Owls c. Foxes d. Bats

4. The ability to do work is .....  
a. energy. b. force. c. push. d. pull.

5. Tapetum lucidum exists in all of the following, except .....  
a. horses. b. cats. c. humans. d. dogs.

**2 Put (✓) or (✗) :**

1. Exhaled air carries oxygen. ( )

2. When the roller coaster comes down fast, its kinetic energy increases. ( )

3. In the electric generator, kinetic energy is converted into electric energy. ( )

4. Some animals can see at night. ( )

5. Human can identify spoiled food through touch sense. ( )

**B** (A) Choose from column (B) what suits it in column (A) :

<b>Column (A)</b>	<b>Column (B)</b>
1. Gravity	a. the energy stored inside the body.
2. Friction	b. the force that pulls things downwards.
3. Speed	c. a force that arises between the surfaces of two contacted bodies.
4. Potential energy	d. energy stored inside dry batteries.
	e. the distance covered per time unit.

1

2. 五十年來的社會經濟政策

3.

4

(B) Calculate that speed of a runner that covers 150 meters in 10 seconds.

**1 Choose the correct answer :**

1. When light falls on a dark surface, .....
  - a. the surface absorbs the light.
  - b. light passes through it.
  - c. the light is refracted.
  - d. nothing happens.
  
2. What happens to living organisms that can't adapt to the conditions of their environment ?
  - a. Their number increases.
  - b. They can't stay in the environment.
  - c. They keep their number constant.
  - d. They can survive in the environment.
  
3. ..... energy affects the sensory receptors in the eye causing vision.
 

a. Sound	b. Kinetic
c. Light	d. Magnetic
  
4. All of the following are examples of pulling force, except .....
 

a. kicking a ball.	b. pulling the rope.
c. opening the desk's drawer.	d. lifting up your bag.

**2 Put (✓) or (✗) :**

1. Human can identify spoiled food through touch sense. ( )
2. Bats use their sense of smell to avoid dangers. ( )
3. The skin is the sensory organ that makes you feel the smoothness of cloth. ( )
4. Energy is neither destroyed nor created from nothing. ( )

**3 Choose from column (B) what suits it in column (A) :**

(A)

Column (A)	Column (B)
1. Carbon dioxide	a. process that diaphragm expands and moves up.
2. Exhalation	b. the process of pushing air in and out of the body.
	c. is a gas that is produced by respiration process.

1. ....

2. ....

(B)

Column (A)	Column (B)
1. Gravity	a. the energy stored inside the body.
2. Friction	b. the force that pulls things downwards.
3. Speed	c. a force that arises between the surfaces of two contacted bodies.
4. Potential energy	d. energy stored inside dry batteries.
	e. the distance covered per time unit.

1.

2.

3.

4.

**4** Complete the following sentences :

1. The lungs are one of the important organs in the ..... system.
2. When light is reflected off a surface in different directions, so that surface is .....
3. The fat layer under the animal's skin to warm it is considered a ..... adaptation.

**5** (A) What is a common mean of communication between humans and some animals?

(B) A dolphin can locate living organisms and things under the surface of the water. Explain why ?

5

Giza

Giza Educational Zone

**1** Complete the following sentences using the words between brackets :

1. From the opaque objects ..... (carton – glass)
2. Sensory receptors send a message ..... (from the brain to the muscles – from the sensory organs to the brain)
3. When a person pushes a car forward, his body begins to sweat heavily because his body ..... his stored energy. (consumes – increases)
4. The gas oven converts ..... energy stored in the natural gas into heat energy to cook the food. (chemical – electrical)

**2** Choose the correct answer :

1. When a body moves forward, the change that occurs is In .....
  - a. the position of the body.
  - b. the size of the body.
  - c. the mass of the body.
  - d. the Earth's gravity.

2. All the following represent the pushing force, except to .....
- kick a ball.
  - press on electrical switch.
  - close the disk's drawer.
  - lifting up a bag.
3. The ..... system helps us to translate messages that come from our surroundings, such as smells and sounds.
- respiratory
  - digestive
  - nervous
  - circulatory
4. Raising the thumb up or lower it down is a kind of .....
- colors.
  - codes.
  - waves.
  - lights.

- 3** Put (✓) or (✗) :
- The ear is the sense organ which is responsible for seeing objects. ( )
  - The human digestive system breaks down food into nutrients. ( )
  - When the position of a body changes according to a fixed point, the body moves. ( )

**4** (A) Calculate the speed of a train that covers 600 kilometers in a time of 6 hours.

(B) Look at the following figures, then answer the questions :

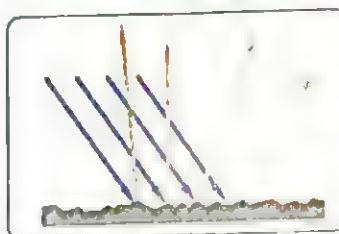


Fig. (A)

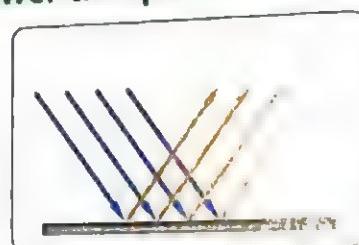


Fig. (B)

Which of the previous figures represents the reflection of light rays from a wooden spoon? And explain why?

**5** Choose from column (B) what suits it column (A) :

Column (A)	Column (B)
1. Gravity	a. the energy stored inside the body.
2. Friction	b. the force that pulls things downwards.
3. Speed	c. a force that arises between the surfaces of two contacted bodies.
4. Potential Energy	d. energy stored inside dry batteries.
	e. the distance covered per time unit.

1. ....

2. ....

3. ....

4. ....

**1 Choose the correct answer :**

1. One of the behavioral adaptation that helps animal protect itself from enemies is .....  
a. camouflage. b. extinction. c. reproduction. d. digestion.
2. The force that slows down (decreases) the speed is called .....  
a. push. b. gravity. c. friction. d. pull.
3. The organ responsible for the sight sense is .....  
a. the ear. b. the tongue. c. the nose. d. the eye.
4. Ability to do work is .....  
a. energy. b. force. c. push. d. pull.
5. An animal has the ability to turn its head in all directions is the .....  
a. snake. b. jerboa c. dolphin. d. owl.

**2 Put (✓) or (✗) :**

1. Wood is a transparent material that allows light to pass through it. ( )
2. A static ball moves on the ground if it is affected by a force. ( )
3. In the electric fan, the kinetic energy is converted into heat energy. ( )
4. Light travels in straight lines. ( )
5. Some animals can see at night. ( )

**3 (A) Complete the following sentences using the words between brackets :**

1. The speed of moving object = .....  $(\text{distance} \times \text{time} - \frac{\text{distance}}{\text{time}})$
2. Fish have ..... to breath.  $(\text{gills} - \text{lungs})$
3. One of the light reflecting materials is .....  $(\text{wood} - \text{mirror})$
4. ..... is a source of light.  $(\text{the Sun} - \text{the eye})$

**(B) Some dogs live in a cold environment, while others live in a hot environment. in your opinion, which of them have thick fur ? And why ?**

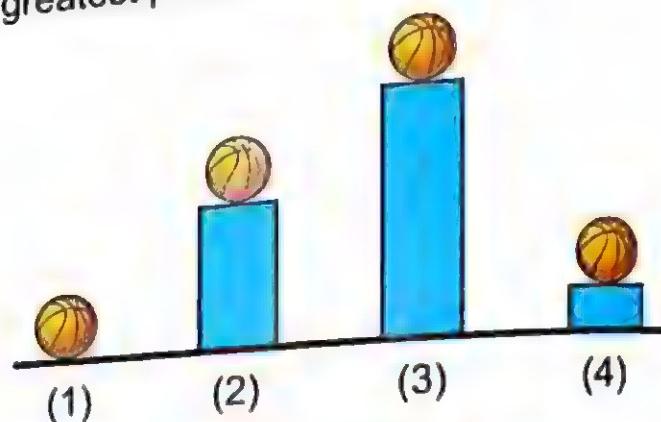
.....

.....

.....

**1 Choose the correct answer :**

1. Which of the following is a source of light ? .....  
 a. Eye.      b. Moon.      c. Fire.      d. Mirror.
2. Bats are ..... animals.  
 a. nocturnal      b. morning      c. not hearing      d. not flying
3. In the opposite figures which ball has the greatest potential energy ? .....  
 a. Figure (1).  
 b. Figure (2).  
 c. Figure (3).  
 d. Figure (4).



4. The force that pulls the objects down toward the center of the Earth is .....  
 a. gravity.      b. pushing.      c. water.      d. wind
5. The force that slows down or decreases the speed of an object is .....  
 a. push.      b. gravity.      c. friction.      d. pull.

**2 Put (✓) or (✗) :**

1. Foxes have strong hearing sense. ( )
2. Wood is a transparent object that allows light to pass through it. ( )
3. Food turns from complex to simple during the digestion process. ( )
4. The chemical energy in a battery can be converted into electrical energy. ( )

**3 Choose from column (B) what suits it in column (A) :**

Column (A)	Column (B)
1. Camouflage	a. it helps us to see.
2. Smell	b. a type of adaptation that helps an animal to hide. c. ants use it to communicate.

1.

2.

**4 (A) Complete the following sentences :**

1. The different languages are considered as .....
2. During exhalation, ..... gas comes out of the lung.

(B) Look at the following figures, then answer the questions :



Fig. (A)



Fig. (B)

1. Which figure represents a transparent object ? ..... (.....)
2. Which figure represents an opaque object ? ..... (.....)

**8****El-Qalyoubia Governorate****Obour Educational Zone**

**1 Choose the correct answer :**

1. The organ responsible for the sight sense is .....  
a. the ear.      b. the tongue.      c. the nose.      d. the eye.
2. One of the behavioral adaptations that helps the animal protects itself from enemies .....  
a. camouflage.    b. extinction.    c. immigration.    d. reproduction.
3. ..... energy affects the sensory receptors in the eye, causing vision.  
a. Sound      b. Kinetic      c. Light      d. Magnetic
4. Animals can communicate with each other through .....  
a. sound and lights.      b. talking.  
c. reading.      d. writing.
5. The roots of palm plants help them to .....  
a. stand strong against the wind.    b. reach the underground water.  
c. fixing plants in the soil.    d. all the previous.
6. The force that pulls the objects down toward the center of the Earth is .....  
a. gravity.      b. pushing.      c. water.      d. wind.
7. The chemical energy stored in batteries is considered a form of .....  
a. potential energy.      b. kinetic energy.  
c. heat energy.      d. light energy.

**2 Put (✓) or (✗) :**

1. Food turns from complex to simple during the digestion process. ( )
2. While running and making an effort, the number of breathing times decreases ( )
3. Sending bad smells by Acacia tree is a behavioral adaptation. ( )

**3** Match column (B) with column (A) :

Column (A)	Column (B)
1. Tapetum lucidum	a. it is a common organ in the digestive and respiratory systems.
2. Pharynx	b. a muscle that has an important role in the respiration. c. a structural adaptation in the eye provides some animal a better vision at night.

1. .... 2. ....

**4** Complete the following sentences from the two brackets :

1. .... destroys the lungs and causes many diseases.

(Breathing – Pollution)

2. The speed of a moving object = ....

(distance × time – distance / time)

**5** Answer the following question :

Rabbits have long and strong hind legs that help them to jump quickly and escape in dangerous times. Determine the type of adaptation.

.....

9

Self Assessment

Al-Hessina Ed.

Final Zone

**1** Choose the correct answer :

- One of the behavioral adaptations that helps the animal protect itself from enemies .....  
a. camouflage. b. extinction. c. immigration. d. reproduction.
- All of the following are components of the nervous system, except .....  
a. spinal cord. b. heart. c. nerves. d. brain.
- Objects need a force to move, this force is represented in (called) .....  
a. pushing only. b. pulling only.  
c. pushing and pulling together. d. the Earth gravity only.

**2** Put (✓) or (✗) :

- The Moon is a source of light. ( )
- Red and green traffic lights are considered codes. ( )
- When you kick a ball, kinetic energy is produced. ( )

**3** Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Motion	a. A structural adaptation whose function is similar to the lungs.
2. Gills	b. A type of adaptation that helps an animal to hide.
3. Camouflage	c. The change in the position of an object with respect to a fixed point.

1. .... 2. .... 3. ....

**4** Complete the following sentences using the words between brackets :

1. The time that the body takes to react to different information from the environment is called ..... (reflex action – reaction time)
2. Bats use ..... as a means of communication with each other. (sound – light)
3. The ability to do a work is called ..... (energy – gravity)

**5** (A) Answer the following questions :

1. A dolphin can locate living organisms and things under the surface of the water. Explain Why?  
.....
2. When you sit on the chair without moving. What is the name of the force that pulls you downward ?  
.....

## (B) Give a reason for the following:

The leaves of plants that float above the surface of the water are so wide.  
.....

**10****El-Garbia Governorate****El-Santa Educational Zone****1** Choose the correct answer :

1. When a ball stands on the ground without moving, the forces acting on it are .....  
 a. balanced.    b. unbalanced.    c. push it up.    d. not equal.
2. The chemical energy stored in batteries is considered a form of .....  
 a. kinetic energy.    b. potential energy.  
 c. heat energy.    d. light energy.
3. The ability to do work is .....  
 a. force.    b. energy.    c. pull.    d. push.

**2** Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Jerboa	a. it depends on the body's sense of heat for predation.
2. Snake	b. it depends on the echo of the sound in locating the prey
3. Bat	c. it depends on its hind legs to jump.

1. ....

2. ....

3. ....

**3** Put (✓) or (✗) :

1. Gravity pulls objects towards the center of the Earth. ( )
2. In the electric fan, the kinetic energy is converted into electric energy. ( )
3. When the roller coaster slides down fast, its kinetic energy increases. ( )

**4** (A) If the two cars moved at the same time for 20 seconds, car covered a distance of 100 meters, while car (B) covered a distance of 120 meters. Which of the two cars has a higher speed ?

.....  
.....  
.....  
.....  
.....

(B) Calculate the speed of a train that covers 600 km in a time of 6 hours.

.....  
.....  
.....  
.....  
.....

**5** Complete the following sentences using the words between brackets :

1. .... is an opaque object. (Carton – Glass)
2. .... is the organ that we can use to send or receive a light code. (Eye – Heart)
3. The time that the body takes to react to different information from the environment is called ..... (reflex action – reaction time)

**11****Kafry El-Sheikh Governorate****Al-Hamoul Educational Zone****1 Choose the correct answer :**

1. Raising the thumb up or lower it down is a kind of .....  
a. colors.      b. codes.      c. waves.      d. lights
2. The organ responsible for the sight sense is .....  
a. the ear.      b. the tongue.      c. the nose.      d. the eye.
3. One of the behavioral adaptations that help the animal protect itself from enemies .....  
a. camouflage.      b. extinction.      c. immigration.      d. reproduction.
4. An animal that has the ability to turn its head in all directions is .....  
a. snake.      b. jerboa.      c. dolphin.      d. owl.
5. When a body moves forward, the change that occurs is in .....  
a. the position of the body.      b. the size of the body.  
c. the mass of the body.      d. the Earth's gravity.

**2 Put (✓) or (✗) :**

1. The ear is the sense organ which is responsible for seeing objects. ( )
2. The brain is responsible for processing information. ( )
3. Foxes have a strong hearing sense. ( )
4. In order for the code to be transmitted, the brain must identify it. ( )
5. Force is the ability to do work or cause change. ( )

**3 Match column (B) to column (A) .**

(A)	(B)
1. Light	a. an animal with a bowl-like face.
2. Owl	b. it is the visible form of energy that is transmitted in the form of waves. c. it depends on its hind legs to jump.

1. ....

2. ....

**4 Complete the following sentences from the two brackets :**

1. .... is an opaque object. (Wood – Glass)
2. .... is the organ that we can use to send or receive a sound code. (Ear – Heart)
3. .... tree has long and strong roots to resist the water waves (Palm – Mangrove)

**1 Choose the correct answer :**

1. Tapetum lucidum exists in all of the following, except .....  
a. the horse.    b. the cat.    c. the human.    d. the dog.
2. Bats are ..... animals.  
a. nocturnal    b. morning    c. not hearing    d. not flying
3. When a body moves forward, the change that occurs is in .....  
a. the position of the body.    b. the size of the body.  
c. the mass of the body.    d. the Earth's gravity.
4. The force that slows down or decreases the speed of an object is .....  
a. push.    b. gravity.    c. friction.    d. pull.

**2 Put (✓) or (✗) :**

1. The ear is the sense organ which is responsible for seeing objects. ( )
2. Exhaled air carries oxygen. ( )
3. In electric fan, the kinetic energy is converted into electric energy. ( )
4. Red and green traffic lights are considered codes. ( )

**3 Complete the following :**

Keys :

1. If Noor travels with her bicycle in one hour at a speed of two hours, then she is moving at a speed of ..... (2 km/hr. – 5 km/hr.)
2. What carries the message from your eyes to your brain when you see something ? ..... (Nerves – Muscle)
3. What kind of energy is stored inside the battery ? ..... (Chemical energy – Heat energy)
4. The force that pulls things down is to the ground ..... (friction – gravity)

**4 Match column (B) to column (A) :**

(A)	(B)
1. Light	a. It depends on its hind legs to jump.
2. Smell	b. It is the visible form of energy that is transmitted in the form of waves. c. ants use it to communicate.

1. ....

2. ....

**1 Choose the correct answer :**

1. An animal that has the ability to turn its head in all directions is .....  
a. snake.      b. jerboa.      c. dolphin.      d. owl.
2. ..... energy affects the sensory receptors in the eye, causing vision.  
a. Sound      b. Kinetic      c. Light      d. Magnetic
3. All of the following are examples of pulling force, except .....  
a. kicking a ball.      b. pulling the rope.  
c. opening the desk's drawer      d. lifting up a ball.
4. A horse is faster than a human, as the human covers a ..... distance at the same time.  
a. less      b. greater      c. double      d. twice
5. Each of the following is considered a source of light, except .....  
a. the fire.      b. the Sun.      c. the lamp.      d. the eye.

**2 Put (✓) or (✗) :**

1. The brain is responsible for processing information. ( )
2. When a pen falls down from your hand, then the acting force is the gravity force. ( )
3. Dolphins have a strong sight sense. ( )
4. Energy is neither destroyed nor created from nothing. ( )
5. Both humans and animals need a source of light to see. ( )

**3 Choose from column (B) what suits it in column (A) :**

(A)	(B)
1. Motion	a. a muscle that has an important role in the respiration process.
2. The spinal cord	b. it gives a message to the muscle to contract.
3. Diaphragm	c. the ability to do work.
4. Work	d. the change in the position of an object with respect to a fixed point.
5. Energy	e. the force that causes the body to move.
	f. electric energy is converted into kinetic energy.

1. ....

2. ....

3. ....

4. ....

5. ....

**1 Choose the correct answer :**

1. One of the behavioral adaptations that helps the animal protects itself from enemies .....  
a. camouflage. b. extinction. c. immigration. d. reproduction.
2. To communicate through the sight sense we need .....  
a. making a sound. b. availability of light.  
c. hearing music. d. touching something.
3. Each of the following is considered a source of light, except .....  
a. the fire. b. the Sun. c. the lamp. d. the eye.
4. All of the following are examples of pulling force, except .....  
a. kicking a ball. b. pulling the rope.  
c. opening the desk's drawer. d. dragging a car toy.
5. The ability to do work is .....  
a. energy. b. force. c. push d. pull.

**2 (A) Put (✓) or (✗) :**

1. If the acting forces on a moving body decrease, the speed of this body increases. ( )
2. The nervous system is responsible for breathing. ( )
3. Bats use their sense of smell to avoid dangers. ( )
4. Seeing with our eyes is a way to help us collect information about the environment around us. ( )

(B) Calculate the speed of a train that covers 600 kilometers in a time of 6 hours.

**3 (A) Choose from column (B) what suits it in column (A) :**

(A)	(B)
1. Carbon dioxide	a. a gas necessary for respiration.
2. Oxygen	b. a structural adaptation whose function is similar to the lungs.
3. Gills	c. it helps us to see. d. is a gas that is produced during respiration process.

1. .... 2. .... 3. ....

**(B) Look at the opposite figure, then answer the question :**

When the compressed spring is released,  
a change in energy occurs from .....  
energy to ..... energy.



15

Sohag Governorate

Sohag Educational Zone

**1** Complete the following sentences from the two brackets :

1. From the opaque objects ..... (carton – glass)
2. The amount of energy required to move an object through the force acting on it is called ..... (work – potential)
3. From the organs that we can use to send or receive the code ..... (heart – ear)
4. The echo sound feature depends on ..... (hearing sense – sight sense)
5. ..... destroys the lungs and causes many diseases. (Breathing – Pollution)
6. ..... mix and grind food inside the mouth. (Teeth only – Teeth and tongue)

**2** Put (✓) or (✗) :

1. Wood is a transparent object that allows light to pass through it. ( )
2. The digestive system in animals breaks down food into simple substances. ( )
3. Animals digging holes are a form of structural adaptation. ( )
4. Snakes have the ability to rotate their heads in all directions. ( )
5. When the position of the body changes according to a fixed point, the body moves. ( )

**3** Answer the following :

1. Which of the following consumes less fuel a truck or a small car ?

- .....
2. When you sit on the chair without moving. What is the name of the force that pulls you downward ?

- 4 (A) 1. d    2. d  
3. c    4. c

(B)

Types of communication	The used senses
1. Watching TV.	- Sight and hearing.
2. Flashing lights of fireflies.	- Sight.
3. Echolocation in dolphins.	- Hearing.
4. Using the cell phone.	- Sight and hearing.

**Model Exam 10**

- 1 (A) 1. c    2. a  
3. d    4. c

(B) Because it transfers messages between the brain and body parts.

- 2 (A) 1. energy  
2. bat – dolphin  
3. kinetic    4. kinetic

$$(B) \text{ Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$= \frac{100}{2} = 50 \text{ km/hr.}$$

- 3 (A) 1. e    2. d    3. a  
4. b    5. c

(B) It will fall down on the ground due to the pulling force of gravity.

- 4 (A) 1. (✓)    2. (✓)    3. (✗)  
4. (✓)

- (B) 1. (1), (3)    2. (4)  
3. (2)

**Final Examination of Some Governorates****Cairo Governorate****1 Nasr City Edu. Zone**

- 1 1. (✗)    2. (✗)    3. (✓)    4. (✓)

- 2 1. the brain    2. echolocation  
3. nervous    4. esophagus.

- 3 1. a    2. a    3. d    4. c

4 (A) Because dolphin use echolocation as it has a strong sense of hearing.

(B) Snake

**2 Heliopolis Edu. Zone**

- 1 1. b    2. a    3. d  
4. d    5. a

- 2 1. (✓)    2. (✗)    3. (✗)  
4. (✓)    5. (✗)

- 3 (A) 1. Kinetic energy.

2. Kilometer.

3. Camouflage.

(B) 1. Dogs live in cold environment have thick fur to keep their bodies warm.

2. The Sun and a candle.

**3 El-Sahel Edu. Zone**

- 1 1. a    2. c    3. c  
4. a    5. c

- 2 1. (✗)    2. (✓)    3. (✗)  
4. (✓)    5. (✗)

- 3 (A) 1. b    2. c    3. e  
4. a

$$(B) \text{ Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$= \frac{150}{10} = 15 \text{ m/sec.}$$

**4 El-Zeitoun Edu. Zone**

- 1 1. a    2. b    3. c    4. a

- 2 1. (✗)    2. (✗)    3. (✓)    4. (✓)

- 3 (A) 1. c    2. a  
(B) 1. b    2. c    3. e    4. a

- 4 1. respiratory    2. rough.  
3. structural

- 5 (A) using codes.

(B) Because dolphin use echolocation as it has a strong sense of hearing.

**Giza Governorate****5 North Giza Edu. Zone**

- 1** 1. carton  
2. from the sensory organs to the brain.  
3. consumes      4. chemical
- 
- 2** 1. a      2. d      3. c      4. b
- 
- 3** 1. (x)      2. (✓)      3. (✓)
- 
- 4** (A) Speed =  $\frac{\text{Distance}}{\text{Time}}$   
 $= \frac{600}{6} = 100 \text{ km/hr.}$

(B) Figure (A), because the wooden spoon is a rough surface, so it reflects light in different directions.

- 
- 5** 1. b      2. c      3. e      4. a

**6<sup>th</sup> of October Edu. Zone**

- 
- 1** 1. a      2. c      3. d  
4. a      5. d
- 

- 2** 1. (x)      2. (✓)      3. (x)  
4. (✓)      5. (✓)
- 

- 3** (A) 1.  $\frac{\text{Distance}}{\text{Time}}$       2. gills  
3. mirror.      4. The Sun

(B) Dogs live in cold environment have thick fur, to keep their body warm.

**Alexandria Governorate****7 El-Agamy Edu. Zone**

- 1** 1. c      2. a      3. c  
4. a      5. c
- 
- 2** 1. (✓)      2. (x)      3. (✓)      4. (✓)
- 
- 3** 1. b      2. c
- 
- 4** (A) 1. codes.  
2. carbon dioxide
- (B) 1. Figure (a).  
2. Figure (b).

**El-Qalyoubia Governorate**

- 8 Obour Edu. Zone**
- 
- 1** 1. d      2. a      3. c      4. a  
5. d      6. a      7. a
- 
- 2** 1. (✓)      2. (x)      3. (✓)
- 
- 3** 1. c      2. a
- 
- 4** 1. Pollution      2.  $\frac{\text{Distance}}{\text{Time}}$
- 
- 5** Structural adaptation.

**El-Sharkia Governorate****9 Al-Hessinia Edu. Zone**

- 1** 1. a      2. b      3. c
- 
- 2** 1. (x)      2. (✓)      3. (✓)
- 
- 3** 1. c      2. a      3. b
- 
- 4** 1. reaction time.  
2. sound      3. energy.

- 5** (A) 1. Because dolphin use echolocation as it has a strong sense of hearing.  
2. Gravity pulling force.
- (B) To absorb a large amount of sunlight.

**El-Gharbia Governorate****10 El-Santa Edu. Zone**

- 1** 1. a      2. b      3. b
- 
- 2** 1. c      2. a      3. b
- 
- 3** 1. (✓)      2. (x)      3. (✓)
- 
- 4** (A) Car (B) has the higher speed.  
(B) Speed =  $\frac{\text{Distance}}{\text{Time}}$   
 $= \frac{600}{6} = 100 \text{ km/hr.}$
- 5** 1. Carton.      2. Eye.  
3. reaction time.

**Kafr El-Sheikh Governorate****11 Al-Hamoul Edu. Zone**

- 1** 1. b      2. d      3. a  
4. d      5. a
- 
- 2** 1. (x)      2. (✓)      3. (✓)  
4. (✓)      5. (x)
- 

- 3** 1. b      2. a
- 

- 4** 1. Wood      2. Ear  
3. Mangrove

**Al-Behira Governorate****12 Abou-Hamous Edu. Zone**

- 1** 1. c      2. a      3. a      4. c
- 
- 2** 1. (x)      2. (x)      3. (x)      4. (✓)
- 
- 3** 1. 5 km/hr.      2. Nerves.  
3. Chemical energy  
4. gravity
- 
- 4** 1. b      2. c
- 

**Beni-Suef Governorate****13 Beba Edu. Zone**

- 1** 1. d      2. c      3. a  
4. a      5. d
- 
- 2** 1. (✓)      2. (✓)      3. (x)  
4. (✓)      5. (✓)

- B** 1. d    2. b    3. a  
4. e    5. c

### **Assiut Governorate**

14 Assiut Edu. Zone

- 1** 1. a    2. b    3. d  
4. a    5. a

**2** (A) 1. ()      2. ()  
          3. ()      4. ()

$$= \frac{600}{6} = 100 \text{ km/hr.}$$

- 3** (A) 1. d      2. a      3. b  
(B) potential – kinetic.

Sohag Governorate

15 Sohag Edu. Zone

- |   |              |                     |
|---|--------------|---------------------|
| 1 | 1. carton    | 2. work             |
|   | 3. ear       | 4. hearing sense    |
|   | 5. pollution | 6. Teeth and tongue |

2. 1. (x)      2. (✓)      3. (x)

- 3** 1. A small car  
2. Gravity pulling force.



## Notes

